Index

SYSTEM OPERATING INSTRUCTIONS

UF3 – Fast Idle Option – Electrical Requirements A-1

OUTLINE A-3

Overview A-1

Engine/Transmission Variations A-4

Factory Installed Equipment A-4

Upfitter Installed Equipment A-5

Operation A-5

Appendix A-6

PTO – Power Take Off Option – Electrical Requirements A-7

OUTLINE A-7

Overview A-8

Engine/Transmission Variations A-9

Vocation/Modes A-9

Factory Installed Equipment A-10

Upfitter Installed Equipment A-10

Operation A-11

Stationary Preset Mode A-12

Stationary Variable Mode A-14

Mobile Variable Mode A-16

PTO Engine Shutdown A-18

Reprogramming A-20

Fast Idle & PTO Switches A-22

(continued on next page)

Index (continued)

ELECTRICAL COMPONENT LOCATIONS

Electrical Component Legend B-1
Ground Zones B-2
Underhood Distribution Center B-3
Fuse Block – Underhood (Primary) Label Usage B-4
Fuse Block – Underhood (Primary) Top View B-5
Fuse Block – Underhood (Primary) Bottom View B-6
Fuse Block – Underhood (Primary) Wire Entry B-7
Fuse Block – Underhood (Secondary) Label B-9
Fuse Block – Underhood (Secondary) B-10
Fuse Block – Underhood (Secondary) Wire Entry B-11
Fuse Block – I/P 1 Label B-12
Fuse Block – I/P 1 Label Usage B-13
Fuse Block – I/P 1 Front View B-15
Fuse Block – I/P 1 Back View B-16
Fuse Block – I/P 1 Wire Entry B-17
Fuse Block – I/P 2 Label B-18
Fuse Block – I/P 2 ..... B-19
Fuse Block – I/P 2 Wire Entry B-20
Location Views – U/H Fuse Center B-22
Location Views – I/P Harness w/I/P-1 & I/P-2 ..... B-23
Location Views – I/P-2 Fuse Center B-24
Turn Signal Flasher B-25

(continued on next page)

Index (continued)

ELECTRICAL AND PIN-OUT ILLUSTRATIONS

12-Way Body Builder Connector C-1
Body Builder Connector Location C-2
10-Way Bus Connector / 2-Way Bus Connector – Family 2 ..... C-3
Bus Connector Location – Family 2 ..... C-4
8.1L (L18) Powertrain Control Module (PCM) – Connector C-1 ..... C-6
8.1L (L18) Powertrain Control Module (PCM) – Connector C-2 ..... C-8
7.8L (LF8) Engine Control Module (ECM) – Location C-10
7.8L (LF8) Engine Control Module (ECM) – Connector C-1 ..... C-11
7.8L (LF8) Engine Control Module (ECM) – Connector C-2 ..... C-13
6.6L (LMM) Engine Control Module (ECM) – Location C-15
6.6L (LMM) Engine Control Module (ECM) – Connector C-1 ..... C-16
6.6L (LMM) Engine Control Module (ECM) – Connector C-2 ..... C-19
7.2L (LF6) CAT Engine Control Module (ECM) – Connector C-1 ..... C-21
7.2L (LF6) CAT Engine Control Module (ECM) – Connector C-2 ..... C-23
16-Way Serial Data Link Connector C-26
Serial Data Link Connector Location C-27
8-Way Tail Lamp Connector C-28
Tail Lamp Connector Location C-29
7-Way Tractor Connector – Family 3 ..... C-30
Tractor Connector – Family 3 Location C-31
7-Way Trailer Connector – Family 2 ..... C-32
Trailer Connector Location – Family 2 ..... C-33
7-Way Trailer Connector – Family 3 ..... C-34

(continued on next page)

Index (continued)

ELECTRICAL AND PIN-OUT ILLUSTRATIONS (continued)

10-Way Transmission Optional Connector C-36
Transmission Optional Connector Location C-37
10-Way Upfitter PTO Connector C-38
Upfitter PTO Connector Location C-39
C127 Engine Chassis Harness to Remote Power Take Off (PTO) (LF8) C-40
Right Rear Side of Engine Compartment (LF8) C-41

(continued on next page)

Index (continued)

SUBSYSTEM ELECTRICAL SCHEMATICS

Schematic Description and Navigation Instructions D-1

Power Distribution

(L18) 8.1L V8 GMPT VORTEC® - Gas D-3

(LMM) 6.6L V8 Isuzu DURAMAX® - Diesel D-12

(LF8) 7.8L L6 Isuzu 6H - Diesel D-21

(LF6) 7.2L L6 Caterpillar® C7 - Diesel D-30

Ground Distribution

(L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel D-39

(LF8) 7.8L L6 Isuzu 6H - Diesel D-51

(LF6) 7.2L L6 Caterpillar® C7 - Diesel D-64

Power Take-Off

(L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel –
(LF8) 7.8L L6 Isuzu 6H - Diesel D-76

(LF6) 7.2L L6 Caterpillar® C7 - Diesel D-78

Auxiliary Power D-80

Engine Controls

(L18) 8.1L V8 GMPT VORTEC® - Gas D-81

(LMM) 6.6L V8 Isuzu DURAMAX® - Diesel D-93

(LF8) 7.8L L6 Isuzu 6H - Diesel D-107

(LF6) 7.2L L6 Caterpillar® C7 - Diesel D-119

Fan Control D-131

ETC

(L18) 8.1L V8 GMPT VORTEC® - Gas D-132

(continued on next page)

Index (continued)

SUBSYSTEM ELECTRICAL SCHEMATICS (continued)

Fuel

(L18) 8.1L V8 GMPT VORTEC® - Gas - Family 2 ..... D-134
(L18) 8.1L V8 GMPT VORTEC® - Gas - Family 3 ..... D-136
(LMM) 6.6L V8 Isuzu DURAMAX® - Diesel D-138
(LF8) 7.8L L6 Isuzu 6H - Diesel - (LF6) 7.2L L6 Caterpillar® C7 - Diesel D-139

Heated Fuel/Water In Fuel

(LMM) 6.6L V8 Isuzu DURAMAX® - Diesel D-140
(LF6) 7.2L L6 Caterpillar® C7 - Diesel D-141
(LF8) 7.8L L6 Isuzu 6H - Diesel D-142

Automatic Transmissions

LCT Transmission D-143
MD Transmission D-146

Exhaust Brake/Resistor

(LMM) 6.6L V8 Isuzu DURAMAX® - Diesel – (LF8) 7.8L L6 Isuzu 6H - Diesel –
(LF6) 7.2L L6 Caterpillar® C7 - Diesel D-149

Starting & Charging

(L18) 8.1L V8 GMPT VORTEC® - Gas D-150
(LMM) 6.6L V8 Isuzu DURAMAX® - Diesel D-153
(LF8) 7.8L L6 Isuzu 6H - Diesel D-156
(LF6) 7.2L L6 Caterpillar® C7 - Diesel D-158

Cruise Control

(L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel D-160
(LF8) 7.8L L6 Isuzu 6H - Diesel D-161
(LF6) 7.2L L6 Caterpillar® C7 - Diesel D-162

(continued on next page)

Index (continued)

SUBSYSTEM ELECTRICAL SCHEMATICS (continued)

Batteries

(L18) 8.1L V8 GMPT VORTEC® - Gas - Top Post D-163
(L18) 8.1L V8 GMPT VORTEC® - Gas - Side Post D-165
(L18) 8.1L V8 GMPT VORTEC® - Gas - Bus D-166
(LMM) 6.6L V8 Isuzu DURAMAX® - Diesel D-167
(LMM) 6.6L V8 Isuzu DURAMAX® - Diesel - Bus D-169
(LF8) 7.8L L6 Isuzu 6H - Diesel D-170
(LF6) 7.2L L6 Caterpillar® C7 - Diesel D-171

2-Speed Rear Axle

(L18) 8.1L V8 GMPT VORTEC® - Gas – (LF8) 7.8L L6 Isuzu 6H - Diesel D-172
(LF6) 7.2L L6 Caterpillar® C7 - Diesel D-174

Active Transfer Case D-176

Horn D-178

Brakes

Hydraulic (C4500 thru C7500) D-179
Air (C7500 thru C8500) D-185

Park Brake

Park Brake (Family 2) D-190
Park Brake (Family 3) D-191

SIR D-192

Rear Air Suspension D-194

(continued on next page)

Index (continued)

SUBSYSTEM ELECTRICAL SCHEMATICS (continued)

Serial Data

Data Link Connector D-195
Serial Data Link (Class 2) D-198
Serial Data Gateway D-199
Diagnostic Tool Connector D-200
J1939 - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LF8) 7.8L L6 Isuzu 6H - Diesel –
(LF6) 7.2L L6 Caterpillar® C7 - Diesel D-201

HVAC

Heater Only D-208
Active - (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel D-209
Passive - (LF8) 7.8L L6 Isuzu 6H - Diesel D-211
Rear Heater - Crew Cab D-213
Rear Defogger - Crew Cab D-214

Chime D-215

Displays

Instrument Panel Cluster (IPC) D-216
Tell Tale Module & Gauges D-218

Windshield Wiper/Washer D-220

Headlamps

Dual Headlamps D-221
Quad Headlamps (Family 2) D-222

Daytime Running Lamps (DRL) D-223

Exterior Lighting D-224

(continued on next page)

Index (continued)

SUBSYSTEM ELECTRICAL SCHEMATICS (continued)

Interior Lighting **D-230**
Truck/Trailer Wiring
Truck/Trailer Wiring (Family 2) D-235
Truck/Trailer Wiring (Family 3) D-236
Tractor Wiring (Family 3) D-238
Body Builder Connector **D-240**
School Bus Upfitter **D-241**
Power Windows
Power Windows - Regular Cab D-242
Power Windows - Crew Cab D-243
Power Door Locks **D-245**
Remote Keyless Entry (RKE) **D-247**
Power Mirrors **D-248**
Entertainment
Radio D-250
Speakers D-251

(continued on next page)

Upfitter's Quick Reference Index

UPFITTER'S QUICK REFERENCE

Connector Terminal Contacts

Delphi E-1
Bosch E-1
Sumitomo E-1

Power Take-off (PTO)

Description and Operation E-2
Diagnostic Checks
Diagnostic Starting Point – Power Take-Off (PTO) E-7
Symptoms – Power Take-Off (PTO) E-7
Power Take-off (PTO) Does Not Engage E-9
Engine RPM Does Not Increase With Power Take-Off (PTO) Engaged E-13
Power Take-Off (PTO) Indicator Inoperative E-15
Schematics
L18–LMM–LF8 ..... E-17
LF6 ..... E-19

Vehicle – Diagnostic System Check E-20
Checking Aftermarket Accessories E-22

Wiring Repairs

Testing for Intermittent Conditions and Poor Connections E-23
Flat Wire Repairs E-27
GMLAN Wiring Repairs E-28
High Temperature Wiring Repairs E-31
Heated Oxygen Sensor Wiring Repairs E-35

(continued on next page)

Upfitter's Quick Reference Index (continued)

UPFITTER'S QUICK REFERENCE *(continued)*

Wiring Repairs *(continued)*

Splicing Copper Wire Using Splice Clips E-36
Splicing Copper Wire Using Splice Sleeves E-38
Splicing Twisted or Shielded Cable E-40
Splicing Inline Harness Diodes E-41
SIR/SRS Wiring Repairs E-42

Lighting

Separating Stop from Turn Signal Lamps E-46

Diesel Emissions

CARB Idle Shutdown Requirements (California Only) E-48

Overview

ORGANIZATION

The Electrical section of the 2008 Medium Duty C Series Body Builder Manual is not split between Family 2 and Family 3 trucks. The Electrical systems are common between the families. Any family specific requirements are called out in the attached documentation. This document is organized as follows:

A. Systems Operation – How it works.

B. Component Locator – Where it is.

C. Connectors & Pinouts – What it looks like.

D. Subsystem Schematics – Detailed wiring and electrical schematic information.

E. Upfitter's Quick Reference – Additional information on existing and new features.

WHAT'S NEW FOR THE MEDIUM DUTY C SERIES

- Major changes for 2008 include:
  - Emission compliant (LF6) 7.2L L6 Caterpillar® C7 diesel added to engine lineup
  - CARB Idle Shutdown required on diesel-powered trucks over 14,000 lb. GVW starting January 2008 (California ONLY)
  - Heated fuel water separator available on (LF6) 7.2L L6 Caterpillar® C7 diesel. Separator to be mounted on left side frame rail.

- The 2008 manual includes schematics for every sub-system in the vehicle.

- A **Schematic Description and Navigation instructions** can be found at the beginning of Section D. This document helps you understand how the schematics are organized and how to read them.

(continued on next page)

(Overview — continued from previous page)

SPECIAL INTEREST TO UPFITTERS

Connectors have been provided to allow easy interface for upfitter equipment rather than splicing into existing harnesses. These subsystems and connectors include:

- Upfitter Provision – PTO related functions
- Trailer Wiring – Class two and three vehicles
- Body Builder Connector – exterior lighting and signaling, power, and 128k Pulse per Mile VSS
- A Ground Block located next to the Body Builder Connector for easy ground termination
- Revised Transmission Optional Connector
- New Remote PTO Connector (7.8L diesel)

Navigation

The Table of Contents and Index items are linked to the actual page. Click on the item of interest and you'll go to the corresponding page. You can return with the "previous page" arrow in the upper center of the screen. Other links embedded in the document are hi-lighted in blue.

Viewing

The size (%) control is located in the lower left corner of the screen. Click the down arrow and select "fit in window" (62%) or "actual size" (100%) for most viewing applications. You can zoom in schematic detail by selecting a larger percentage.

Printing

Specific pages can be printed out. Be careful to select a print range or "current page" or all 400 pages will be printed.

Information provided is believed to be accurate at the time of publication. GM reserves the right to change the information at any time.

System Operating Instructions

UF3 – Fast Idle Option – Electrical Requirements

OUTLINE

- Overview
- Engine/Transmission Variations
- Factory Installed Equipment
- Upfitter Installed Equipment
- Operation
- Appendix
    - Reprogramming the PCM / Using the Tech 2 Scan Tool – (Attachment 1)
    - Illustrations
        - IP Switch Panel (Figure 1)
        - Fast Idle Switch (Figure 2)

OVERVIEW

The UF3 fast idle option allows the operator to push a switch and raise the engine speed to a predetermined Idle RPM value. This feature can only be used when the vehicle is stationary. Examples of Fast Idle applications are battery charging, idle operation of High Electrical Load vehicles, quick warm ups, and improved AC performance.

Scope

The GM (UF3) option described here is the necessary electrical and electronic content to control the engine idle speed. This is not a description of how to install these features if not ordered as part of the option. Base factory settings and procedures to change the factory settings are described here. Responsibility for proper and safe operation for any additional equipment remains with the Upfitter.

(PTO) vs. (UF3) Fast Idle

The (PTO) option allows for increased engine speed operation for increased power output to the PTO unit. The (UF3) fast idle option also allows for increased engine speed but is used for quick warm up, A/C performance, or battery charging. The (PTO) Power Take Off and (UF3) fast idle options are mutually exclusive on the same vehicle with the L18/LLY/LMM/LG4/LF8 engines.

ENGINE/TRANSMISSION VARIATIONS

The 2008 Medium Duty C Series uses 6 engines as shown below:

Engine RPO	Engine Description	Truck Family Available
L18	8.1L V8 GMPT VORTEC® - Gas	2 & 3
LMM	6.6L V8 Isuzu DURAMAX® - Diesel	2
LF8	7.8L L6 Isuzu 6H - Diesel w/2007i Emissions	3
LF6	7.2L L6 Caterpillar® - Diesel	3

FACTORY INSTALLED EQUIPMENT

The UF3 fast idle option includes the Fast Idle Switch, the Fast Idle Indicator Lamp and necessary wiring to the ECM for operation.

- Fast Idle Switch - Use to increase Engine speed to a preset value.
- Fast Idle Indicator Lamp – ECM turns on light to indicate operation in the Fast Idle Mode. This indicator is in the switch.

UPFITTER INSTALLED EQUIPMENT

No upfitter installed equipment is required to operate the function. Responsibility for proper and safe operation for any additional equipment remains with the Upfitter.

OPERATION

Description

Vehicles ordered with the **UF3 (Fast Idle)** option come with a dash mounted switch which allows the user to increase the engine idle speed to a fixed value. The Fast Idle Switch is located to the right of the steering wheel as shown in the illustration (Figure 1). An indicator in the switch lights to show Fast Idle mode is active.

How To Operate

To enable the Fast Idle, the following conditions must be met:

1. Engine must be running
2. Transmission must be in Park or Neutral
3. Vehicle speed must be less than 5 mph
4. Brake or Clutch must not be depressed.

When the above conditions are met, the operator can activate the Fast Idle mode by pressing the Fast Idle Switch. If the switch is pressed while the engine is in the Fast Idle mode, the engine will return to normal base idle.

Engine Calibrations

The factory preset and minimum and maximum programmable speeds are shown in the table below for the **L18/LMM/LF8/LF6 engines:**

PROGRAMMABLE PARAMETERS	DEFAULT SETTINGS (RPM)	MINIMUM VALUE (RPM)	MAXIMUM VALUE (RPM)	ADJUSTMENT RESOLUTION (RPM)
Maximum Fast Idle Speed *Accelerator Disables Fast Idle*	2500	1000 *Can't be set below base Fast Idle Speed Parameters*	3800	25
Base Idle Speed	1200	600 *Normal engine idle will override if higher than Fast Idle.*	1300 *Cannot be set above the maximum Fast Idle Speed Parameter*	25

Note: The Values shown in the above chart are accurate at the time of publication but may change in time for various reasons including running changes made to the ECM, Calibrations, Tech 2 programming, software. Etc.

Caterpillar LF6 Engine

Base Fast Idle is set at the Factory to **1000 RPM**. Fast Idle can be programmed from **700 to 2640 RPM.**

Adjusting the Factory Preset Engine Speed

The Above parameters can be reprogrammed with a GM Tech 2 Diagnostic scan tool for the L18/LMM/LF8/LF6 engines. The Tech 2 connects to the Data Link Connector under the dash. Information regarding reprogramming with the Tech 2 tool can be found in the Appendix. (Attachment 1). Reprogramming the LG5 engine requires a Caterpillar electronic service tool.

APPENDIX

Reprogramming the PCM / Using the Tech 2 Scan Tool
(Attachment 1)

Illustrations
Location of Fast Idle Switch and Indicator – (Figure 1)
Switch Detail – (Figure 2)

System Operating Instructions

PTO – Power Take Off Option – Electrical Requirements

OUTLINE

- Overview
- Engine/Transmission Variations
- Vocation/Modes
- Factory Installed Equipment
- Upfitter Installed Equipment
- Operation *
  - Stationary Preset Mode
  - Stationary Variable Mode
  - Mobile Variable Mode
  - PTO Engine Shutdown
  - Remote Operation
- Appendix
  - Reprogramming the PCM / Using the Tech 2 Scan Tool – (Attachment 1)
  - Illustrations
    - Location of PTO Switch and Indicator – (Figure 1)
    - PTO Switch Detail – (Figure 3)

Note: *Caterpillar has different programming capability. See your dealer for more information.

OVERVIEW

A Power Take Off (PTO) is a gearbox or mechanical device used to transmit mechanical power from the powertrain, through gears or a transmission, to another mechanical or hydraulic device. Examples of PTO applications are: salt spreaders, refuse equipment, plows, pumps, drills, lifts, wrecker equipment, dump bodies, fire/rescue equipment, etc.

PTO Advantages

- PTO's are inexpensive, convenient, safe and reliable.
- PTO's bolt on to the transmission, engine, transfer case or can be incorporated into the accessory belt drive system.
- PTO's eliminate the need for a complex array of levers, controllers, electric motors, etc., which would be required to duplicate the operation of a PTO.

Scope

The PTO unit itself is installed by the Upfitter or Specialty Vehicle Assembler on the vehicle. The GM (PTO) option described here is the necessary electrical and electronic content to control the PTO unit. Responsibility for proper and safe operation remains with the Upfitter. Other PTO related RPO's such as V66 (mechanical provisions for Front PTO) are not addressed here.

(PTO) vs. (UF3) Fast Idle

The (PTO) option allows for increased engine speed operation for increased power output to the PTO unit. The (UF3) fast idle option also allows for increased engine speed but is used for quick warm up, A/C performance, or battery charging. The (PTO) Power Take Off and (UF3) fast idle options are mutually exclusive on the same vehicle with the L18/LMM/LF8/LF6 engines.

ENGINE/TRANSMISSION VARIATIONS

The 2008 Medium Duty C Series uses 6 engines as shown below:

Engine RPO	Engine Description	Truck Family Available
L18	8.1L V8 GMPT VORTEC® - Gas	2 & 3
LMM	6.6L V8 Isuzu DURAMAX® - Diesel	2
LF8	7.8L L6 Isuzu 6H - Diesel w/2007i Emissions	3
LF6	7.2L L6 Caterpillar® - Diesel	3

Many transmissions are available on the 2008 Medium Duty C Series. 13 manual and six automatics are available on Family 3 trucks alone. The Caterpillar engine and some Allison transmissions have dedicated PTO connectors that interface with their control modules. The Engine Controller and Transmission Controller communicate with each other on a high-speed serial data link. The PTO functions are interfaced to the ECM on 2007 Medium Duty C Series to reduce variation in wiring and function. The LF6 Caterpillar engine requires different PTO wiring from the other engine applications but functions in a similar manner. Specific wiring is supplied with the PTO option.

VOCATION/MODES

The primary difference in PTO operation is whether the vehicle is stationary or moving. Stationary operation can have either preset or variable PTO speeds. Some examples of modes and vocations are:

- Stationary Preset – Three preset high idle speeds – Refuse & Wrecker equipment, Fire truck pumpers,
- Stationary Variable – Variable high idle speeds - Drills, Lifts,
- Mobile Variable – Allows variable PTO speeds while the vehicle is moving – Salt Spreaders, Plows, Street Cleaners.

Note: The ECM can be programmed to only one of these modes at any given time. Caterpillar has different programming capability. See your dealer for more information.

FACTORY INSTALLED EQUIPMENT

The PTO option includes the PTO Enable Switch, PTO Relay, K34 Cruise Control Switch, Upfitter Connector to allow optional Upfitter installed switches, and necessary wiring.

- PTO Enable Switch – Located on Dash
- PTO Relay – Turned on by ECM, Provides power for Engage Switch and Load Solenoid.
- K34 Cruise Control Switch – Steering column mounted - use to adjust idle speeds under PTO operation.
- Upfitter Connector – allows interconnection of optional Upfitter installed switches.

UPFITTER INSTALLED EQUIPMENT

Optional Upfitter installed equipment includes Remote PTO Up / Down Switches, PTO Load Engage Switch, PTO Load Solenoid, and Remote Kill Switch. All of these devices interface with the Upfitter Connector.

- Remote PTO Up / Down Switches – Same function as Cruise Control Switches, allows operation outside of Cab for Stationary PTO applications.
- PTO Load Engage Switch – Allows for positive action feedback to ECM for before idle speed is increased. A 5 sec (calibrated) delay occurs without this feedback.

  Note: The Caterpillar ECM does not provide a feedback for PTO operation.
- PTO Load Solenoid – Causes PTO engagement if so equipped.
- Remote Kill Switch – This Normally Closed Switch allows the operator to stop the engine for remote Applications.

OPERATION

Description

The PTO RPO is an option that allows the user to raise the engine speed through the use of designated switches and ECM programming. The ECM can be programmed to one of the following three PTO modes:

- **Stationary Preset mode** – Three preset high idle speeds. Vehicle must be stationary.
- **Stationary Variable mode** – Variable high idle speeds. Vehicle must be stationary.
- **Mobile Variable mode** – Allows variable PTO speeds while vehicle is moving.

These PTO modes are addressed separately and in detail in the following pages.
Please note the ECM can be programmed to only one of the three modes at any one time.

PTO Switches

Vehicles ordered with the **PTO** option come with an IP mounted switch which allows the user to enable the function. The PTO Switch is located to the right of the steering wheel as shown in the illustration (Figure 1 & Figure 3). An indicator in the switch lights to show PTO mode is active. The engine speed can then be changed with either the cruise control switches or upfitter installed remote PTO switches. Cruise Control Switches come with the PTO option on the 2008 Medium Duty C Series. The following chart shows how the switches operate.

	PTO SWITCH CONVERSION CHART	
PTO w/Cruise Switch Operation	**Remote PTO Switch Operation**	**Function**
Cruise On/Off	N/A	Cruise Switch Enable
PTO Enable	N/A	PTO Enable
SET	PTO Down	Lower RPM
RES	PTO Up	Raise RPM

Stationary Preset Mode

Description

The Stationary Preset Mode allows the user to select from three high idle speeds which are programmed in the ECM. The user can toggle between three preset speeds using the SET or RES switches or the Remote PTO Switches.

How To Operate

Prior to enabling the Stationary PTO Mode, the following conditions must be met:

1. Engine must be running.
2. Transmission must be in Park or Neutral.
3. Vehicle speed must be less than 5 mph.
4. Brake or Clutch must not be depressed.

When the above conditions are met, the operator can activate the Stationary PTO by the following sequence:

1. Set the Park Brake.
2. Set the Cruise On/Off Switch to the On position – L18 only.
3. Set PTO Enable Switch to On position.

Upon Completion of the above steps, the PTO Stationary Preset Mode will be enabled and the engine speed will increase to the PTO Base Idle Speed. Toggling the SET and RESume switches will cause the engine RPM to change from normal to either the PTO Preset #1 or PTO Preset #2 speed depending on which switch is pressed first.

Note: LMM/LF8 – ECM enables PTO relay with switch activation. Once on, the ECM won't turn the relay off until the switch is turned off.

Any changes in the above conditions, including depressing the brake or clutch pedals or shifting an automatic transmission in gear, will disable the Stationary Preset Mode causing the engine to return to normal base idle.

Note: L18 - Using the Accelerator to raise the engine above the Maximum Fast Idle Speed will result in disabling the PTO Stationary Preset Mode.
LMM/LF8 – Engine will be governed to PTO Max engine speed with throttle activation. Engine speed will return to pre-activation value after the pedal is released.

Engine Calibrations

The factory preset and minimum and maximum programmable speeds are shown in the table below for the **L18/LMM/LF8 engines:**

PROGRAMMABLE PARAMETERS	DEFAULT SETTINGS (RPM)	MINIMUM VALUE (RPM)	MAXIMUM VALUE (RPM)	ADJUSTMENT RESOLUTION (RPM)
Maximum Fast Idle Speed *Accelerator Disables Fast Idle*	2500 – *L18* 2200 – *LMM/LF8*	1000 *Can't be set below base Fast Idle Speed Parameters*	3800 – *L18* 2200 – *LMM/LF8*	50
PTO Base Idle Speed	1200 – *L18* 850 – *LMM* 1000 – *LF8*	600 *Normal engine idle will override if higher than Fast Idle.*	1300 – *L18* 1400 – *LMM/LF8* *Cannot be set above the maximum Fast Idle Speed Parameter*	50
PTO Preset #1	1200 – *L18* 1250 – *LMM* 1400 – *LF8*	1000 *Can't be set below base Fast Idle Speed Parameters*	Maximum Fast Idle Speed	50
PTO Preset #2	1800 – *L18* 1700 – *LMM/LF8*	1000 *Can't be set below base Fast Idle Speed Parameters*	Maximum Fast Idle Speed	50
PTO Relay Engage Max Engine Speed	1000 – LMM/*LF8*	600	Maximum Fast Idle Speed	50

Note: The Values shown in the above chart are accurate at the time of publication but may change in time for various reasons including running changes made to the ECM, Calibrations, Tech 2 programming, software. Etc.

Caterpillar LG5 Engine

PTO Engine RPM Set Speed is factory set at 1200 rpm. PTO Engine RPM Set Speed can be programmed between 700 and 2640 rpm.

Adjusting the Factory Preset Engine Speed

The Above parameters can be reprogrammed with a GM Tech 2 Diagnostic scan tool for the L18/LMM/LF6/LF8 engines. The Tech 2 connects to the Data Link Connector under the dash. Information regarding reprogramming with the Tech 2 tool can be found in the Appendix (Attachment 1). Reprogramming the LH6 engine requires a Caterpillar electronic service tool.

Stationary Variable Mode

Description

The Stationary Variable Mode allows the user to retain the engine speed at a desired value through the use of the accelerator pedal and the SET or RES switch. The engine speed must be greater than the PTO Base Fast Idle Speed and lower than the Maximum Fast Idle Speed.

How To Operate

Prior to enabling the Stationary Variable PTO Mode, the following conditions must be met:

1. Engine must be running
2. Transmission must be in Park or Neutral
3. Vehicle speed must be less than 5 mph
4. Brake or Clutch must not be depressed.

When the above conditions are met, the operator can activate the Stationary Variable PTO by the following sequence:

1. Set the Park Brake.
2. Set the Cruise On/Off Switch to the On position – L18 only.
3. Set PTO Enable Switch to On position.
4. Depress the Accelerator pedal to obtain the desired high idle speed.
5. Press the SET button to hold engine at the desired high idle speed.

The SET and RES switches can then be used to adjust the engine speed within the Maximum and Minimum RPM values shown in the Engine calibration table (Table A). The adjustment increments are 25 RPM (L18/LF8), 100 RPM (LMM). This function with the remote switches as well as the cruise control switches.

PTO – STATIONARY VARIABLE MODE FUNCTION CHART		
SWITCH	**SET**	**RES**
PRESSING ONCE	Engine speed will decrease by **25 RPM** (L18/LF8), **100 RPM** (LMM) decrements and will maintain the new engine speed value. Engine speed can be decreased down to the engine base idle speed value. If engine speed is at this value, all SET inputs will be ignored.	Engine speed will increase by **25 RPM** (L18/LF8), **100 RPM** (LMM) increments and will maintain the new engine speed value. Engine speed can increase up to the maximum fast idle speed value. If engine speed is at this value, all RES inputs will be ignored.
HELD	Decelerates engine down to the engine base idle speed value.	Increases engine speed up to the maximum fast idle speed value.

Note: If the Stationary Variable Mode is disabled (i.e., brake depressed), it may be re-enabled by pressing the RES switch. This will cause the engine to resume the speed it was prior to disabling.

TABLE "A" — *Engine Calibrations*

The factory preset and minimum and maximum programmable speeds are shown in the table below for the **L18/LLY/LG4 engines:**

PROGRAMMABLE PARAMETERS	DEFAULT SETTINGS (RPM)	MINIMUM VALUE (RPM)	MAXIMUM VALUE (RPM)	ADJUSTMENT RESOLUTION (RPM)
Maximum Fast Idle Speed *Accelerator Disables Fast Idle*	2500 – *L18* 2200 – *LMM/LF8*	1000 *Can't be set below base Fast Idle Speed Parameters*	3800 – *L18* 2200 – *LMM/LF8*	25 – *L18/LF8* 100 – *LMM*
PTO Base Idle Speed	1200 – *L18* 850 – *LMM* 1000 – *LF8*	600 *Normal engine idle will override if higher than Fast Idle.*	1300 – *L18* 1400 – *LMM/LF8* *Cannot be set above the maximum Fast Idle Speed Parameter*	25 – *L18/LF8* 100 – *LMM*
PTO Relay Engage Max Engine Speed	1000 – *LMM/LF8*	600	Maximum Fast Idle Speed	50

Note: The Values shown in the above chart are accurate at the time of publication but may change in time for various reasons including running changes made to the ECM, Calibrations, Tech 2 programming, software. Etc.

Caterpillar LF6 Engine

PTO Engine RPM Set Speed is factory set at 1200 rpm. PTO Engine RPM Set Speed can be programmed between 700 and 2640 rpm. The PTO bump rate is 50 RPM.

Adjusting the Factory Preset Engine Speed

The Above parameters can be reprogrammed with a GM Tech 2 Diagnostic scan tool for the L18/LMM/LF8 engines. The Tech 2 connects to the Data Link Connector under the dash. Information regarding reprogramming with the Tech 2 tool can be found in the Appendix (Attachment 1). Reprogramming the LG5 engine requires a Caterpillar electronic service tool.

Any changes in the above conditions, including depressing the brake or clutch pedals or shifting an automatic transmission in gear, will disable the Stationary Variable Preset Mode causing the engine to return to normal base idle. Using the Accelerator to raise the engine above the Maximum Fast Idle Speed will result in disabling the PTO Stationary Variable Mode.

Mobile Variable Mode

Description

The PTO Mobile Mode allows the driver to maintain a desired engine speed (not vehicle speed) while the vehicle is moving. This feature is available with both manual and automatic transmissions. The engine speed must be greater than the PTO Base Fast Idle Speed and lower than the Maximum Fast Idle Speed. The Vehicle speed must be between the Minimum and Maximum Vehicle Speed Values.

How To Operate

To engage the PTO Mobile Variable Mode, the following conditions must be met in the following order:

1. Engine must be running
2. Transmission must be in gear.
3. Vehicle speed must be between the Minimum and Maximum Vehicle Speeds
4. Brake or Clutch must not be depressed.
5. PTO Enable Switch must be set to the On position

When the above conditions are met, the operator can activate the Mobile Variable mode by the following sequence:

7. Depress the Accelerator Pedal to obtain the desired engine speed.
8. Press the SET button to hold engine at the desired high idle speed.

The SET and RES switches can then be used to adjust the engine speed within the Maximum and Minimum RPM values shown in the Engine calibration table (Table B). The adjustment increments are 25 RPM (L18/LF8), 100 RPM (LMM).

PTO – MOBILE VARIABLE MODE FUNCTION CHART		
SWITCH	**SET**	**RES**
PRESSING ONCE	Engine speed will decrease by **25 RPM** (L18/LF8), **100 RPM** (LMM) decrements and will maintain the new engine speed value. Engine speed can be decreased down to the engine base idle speed value. If engine speed is at this value, all SET inputs will be ignored. If the vehicle reaches the Minimum Vehicle Speed Value, PTO mode will be disengaged.	Engine speed will increase by **25 RPM** (L18/LF8), **100 RPM** (LMM) increments and will maintain the new engine speed value. Engine speed can increase up to the maximum fast idle speed value. If engine speed is at this value, all RES inputs will be ignored. If the vehicle reaches the Maximum Vehicle Speed Value, PTO mode will be disengaged.
HELD	Decelerates engine down to the engine base idle speed. If the vehicle reaches the Minimum Vehicle Speed Value, PTO mode will be disengaged.	Increases engine speed up to the maximum fast idle speed value. If the vehicle reaches the Maximum Vehicle Speed Value, PTO mode will be disengaged.

Note: If the Stationary Variable Mode is disabled (i.e., brake depressed), it may be re-enabled by pressing the RES switch. This will cause the engine to resume the speed it was prior to disabling.

TABLE "B" — *Engine Calibrations*

The factory preset and minimum and maximum programmable speeds are shown in the table below for the **L18/LMM/LF8 engines:**

PROGRAMMABLE PARAMETERS	DEFAULT SETTINGS (RPM)	MINIMUM VALUE (RPM)	MAXIMUM VALUE (RPM)	ADJUSTMENT RESOLUTION (RPM)
Maximum Fast Idle Speed *Accelerator Disables Fast Idle*	2500 – *L18* 2200 – *LMM/LF8*	1000 *Can't be set below base Fast Idle Speed Parameters*	3800 – *L18* 2200 – *LMM/LF8*	25 – *L18/LF8* 100 – *LMM*
PTO Base Idle Speed	1200 – *L18* 1000 – *LMM/LF8*	600 *Normal engine idle will override if higher than Fast Idle.*	1300 – *L18* 1400 – *LMM/LF8* *Cannot be set above the maximum Fast Idle Speed Parameter*	25 – *L18/LF8* 100 – *LMM*
Maximum Vehicle Speed Governing MPH	**20** – *L18* **80** – *LMM* **75** – *LF8*	3 MPH	**30** – *L18* **80** – *LMM* **255** – *LF8*	1
PTO Relay Engage Max Engine Speed	1000 – *LMM/LF8*	600	Maximum Fast Idle Speed	50

Note: The Values shown in the above chart are accurate at the time of publication but may change in time for various reasons including running changes made to the ECM, Calibrations, Tech 2 programming, software. Etc.

Caterpillar LF6 Engine

PTO Engine RPM Set Speed is factory set at 1200 rpm. PTO Engine RPM Set Speed can be programmed between 700 and 2640 rpm. The PTO bump rate is 50 RPM.

Adjusting the Factory Preset Engine Speed

The Above parameters can be reprogrammed with a GM Tech 2 Diagnostic scan tool for the L18/LMM/LF8 engines. The Tech 2 connects to the Data Link Connector under the dash. Information regarding reprogramming with the Tech 2 tool can be found in the Appendix (Attachment 1). Reprogramming the LF6 engine requires a Caterpillar electronic service tool.

PTO Engine Shutdown

Description

The PTO option includes provisions for PTO engine fault shutdown. This feature allows the operator to stop the engine while in PTO mode with an aftermarket installed switch. **If the truck is not in PTO mode, pressing the switch will have no effect on engine operation.** The PTO Upfitter Connector (located on the right side of the engine compartment near the right wheel) Component legend has been provided for installation of remote PTO controls. The upfitter can access the PTO engine fault shutdown circuits through this connector. The upfitter must provide the mating connector, wiring, and remoter switches shown on the Upfitter (PTO) Connector. To install this feature see the upfitter provisions schematics. Important. **If the PTO engine shutdown feature is to be used, it must be turned on in the ECM. If this feature is not turned on it will have no effect on the engine.**

The Above parameters can be reprogrammed with a GM Tech 2 Diagnostic scan tool for the L18/LMM/LF8 engines. The Tech 2 connects to the Data Link Connector under the dash. Information regarding reprogramming with the Tech 2 tool can be found in the Appendix (Attachment 1). Reprogramming the LF6 engine requires a Caterpillar electronic service tool.

Remote Operation

Description

The PTO Upfitter Connector (located on the right side of the engine compartment near the right wheel) Component legend has been provided for installation of remote PTO idle controls. The upfitter can access the PTO high idle circuits through this connector. The upfitter must provide the mating connector, wiring, and remoter switches shown on the Upfitter (PTO) Connector. Two momentary switched are required to duplicate the operation of the SET and RESume switches in the cab. The schematics showing the switches can be found on the Subsystem Electrical schematics under Upfitter Provisions. PTO UP switches duplicate the RES switch operation and the PTO Downswitch duplicates the SET switch operation. **Please note that the PTO high idle must still be enabled from the Cruise On/Off and the PTO enable switches in the cab.**

APPENDIX

Reprogramming the PCM / Using the Tech 2 Scan Tool – (Attachment 1)

Illustrations
- Location Illustrations
  - IP Switch Panel (Figure 1)
  - PTO Enable Switch – See Component Locations – (Figure 3)
  - Upfitter PTO Connector is shown in the connector and pin-out illustrations
- Connector Drawings
  - Upfitter Provisions Connector are shown in the connector and pin-out illustrations

Circuit Schematic References *(Circuit Schematics are shown in the Subsystem Electrical Schematic portion of the Body Builders Manual)*
- Upfitter Provision Connector – L18/LMM/LF8
- Upfitter Provision Connector – LF6
- L18 Gas Engine
- Duramax 6.6L and 7.8L Diesel Engines
- Caterpillar 7.2L Diesel Engine
- PTO Operation w/Isuzu 7.8L Diesel Engine

ATTACHMENT 1

REPROGRAMMING THE PCM/ECM FOR FAST IDLE/PTO USING THE TECH 2 SCAN TOOL

The Tech 2 scan tool MUST be used to enable the Fast Idle and PTO options and adjust the factory preset parameters to desired settings. The Tech 2 menu driven device is a hand held scan tool that plugs into the datalink connector located underneath the dash near the driver's seat. Once the Tech 2 is connected, the following chart will guide the user.

STEP	CURRENT MENU	SELECT
1	MAIN	F0: DIAGNOSTICS
2	VEHICLE IDENTIFICATION	YEAR OF VEHICLE
3	VEHICLE IDENTIFICATION	MEDIUM DUTY TRUCK
4	SYSTEM SELECTION	F0: POWERTRAIN
5	VEHICLE IDENTIFICATION	LP4 OR L21
6	VEHICLE IDENTIFICATION	AUTOMATIC OR MANUAL
7	POWERTRAIN	F2: SPECIAL FUNCTIONS
8	SPECIAL FUNCTIONS	F3: PTO OPTIONS
9	CURRENT PTO SETTINGS	CHANGE OPTIONS
10	PTO OPTIONS	SEE MENU BELOW

TO ADJUST THE MODE OF OPERATION:

The PTO OPTIONS MENU will appear with the selections:

F0: FAST IDLE

FI: STATIONARY PRESET FAST IDLE

F2: STATIONARY VARIABLE FAST IDLE

F3: MOBILE VARIABLE FAST IDLE

Once the mode of operation is selected the **CURRENT PTO SETTINGS** menu will appear with the adjustable parameters for the current mode.

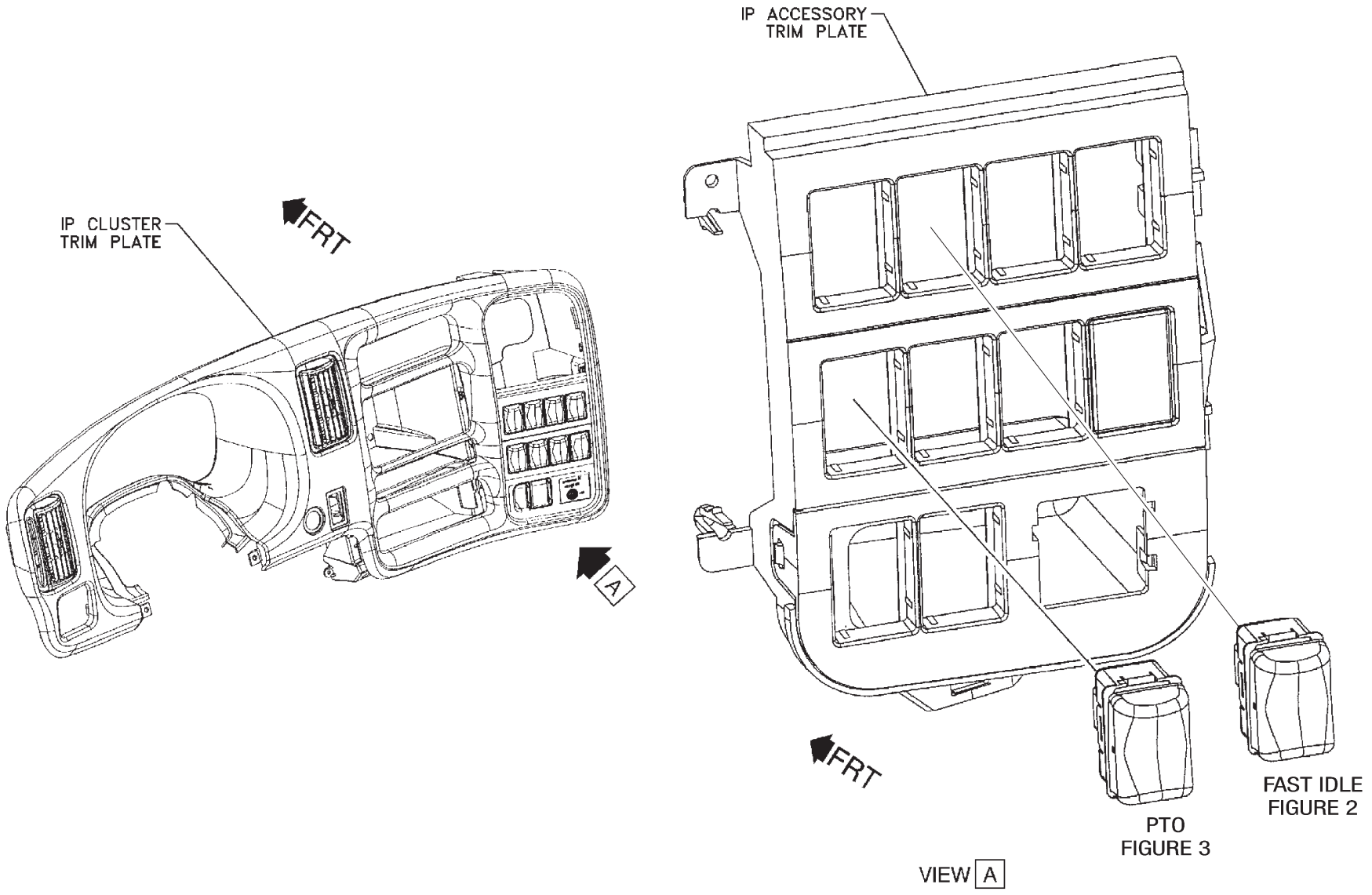
This screen allows the user to increase or decrease engine RPM values using the **INCREASE** and **DECREASE** buttons. If the Engine Fault Shutdown feature is selected, the **YES** or **NO** buttons will determine if this feature is enabled.

After all the settings are adjusted, the user will press the **REPROGRAM** button and the **CURRENT PTO SETTINGS** menu will appear with the changes. The ignition must be turned off for ten seconds to ensure that the program values are stored in the PCM.

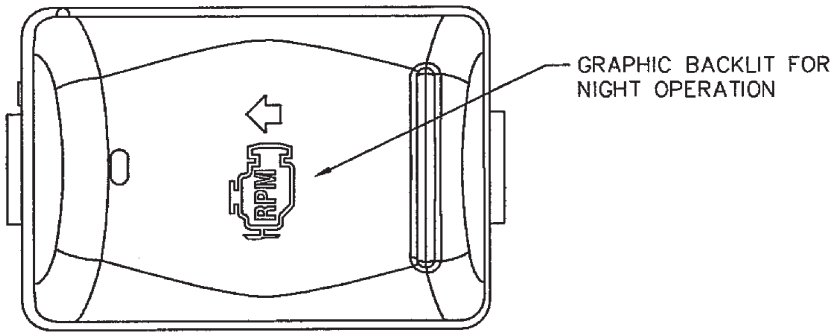
SERVICE CONSIDERATIONS

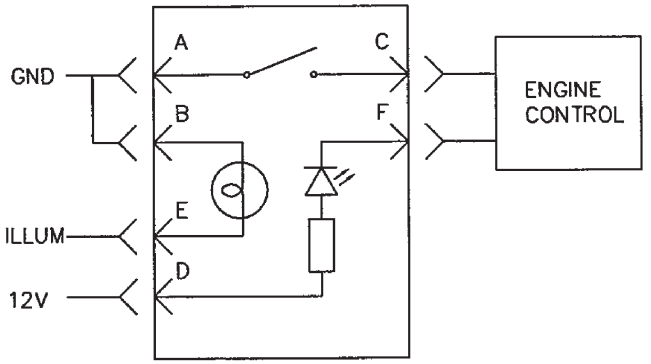
IMPORTANT: Please be aware that UF3 and PTO high idle settings must be reprogrammed in the event that the PCM is replaced. It may be advisable to provide the PCM settings information to the customer in case the PCM requires servicing during some point in the life of the vehicle.

IP, Switch Trim Plate, Fast Idle and PTO Switch Location (Figure 1)

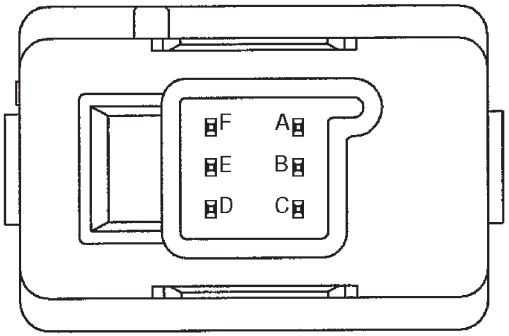


Switch – Fast Idle (Figure 2)

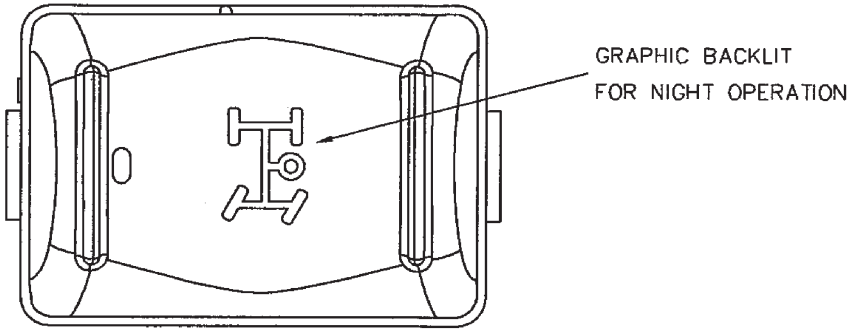


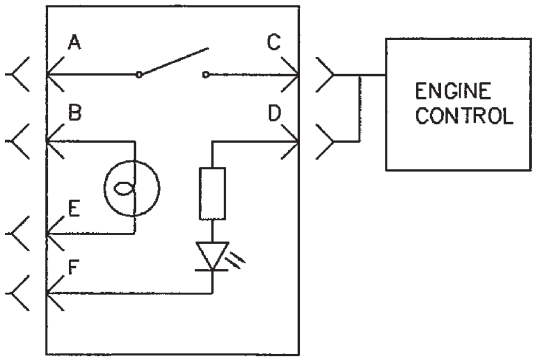


CIRCUIT SCHEMATIC

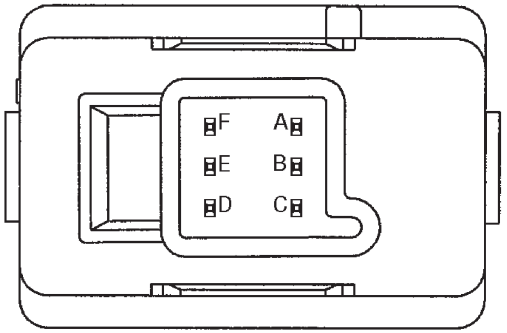


PTO Enable Switch (Figure 3)



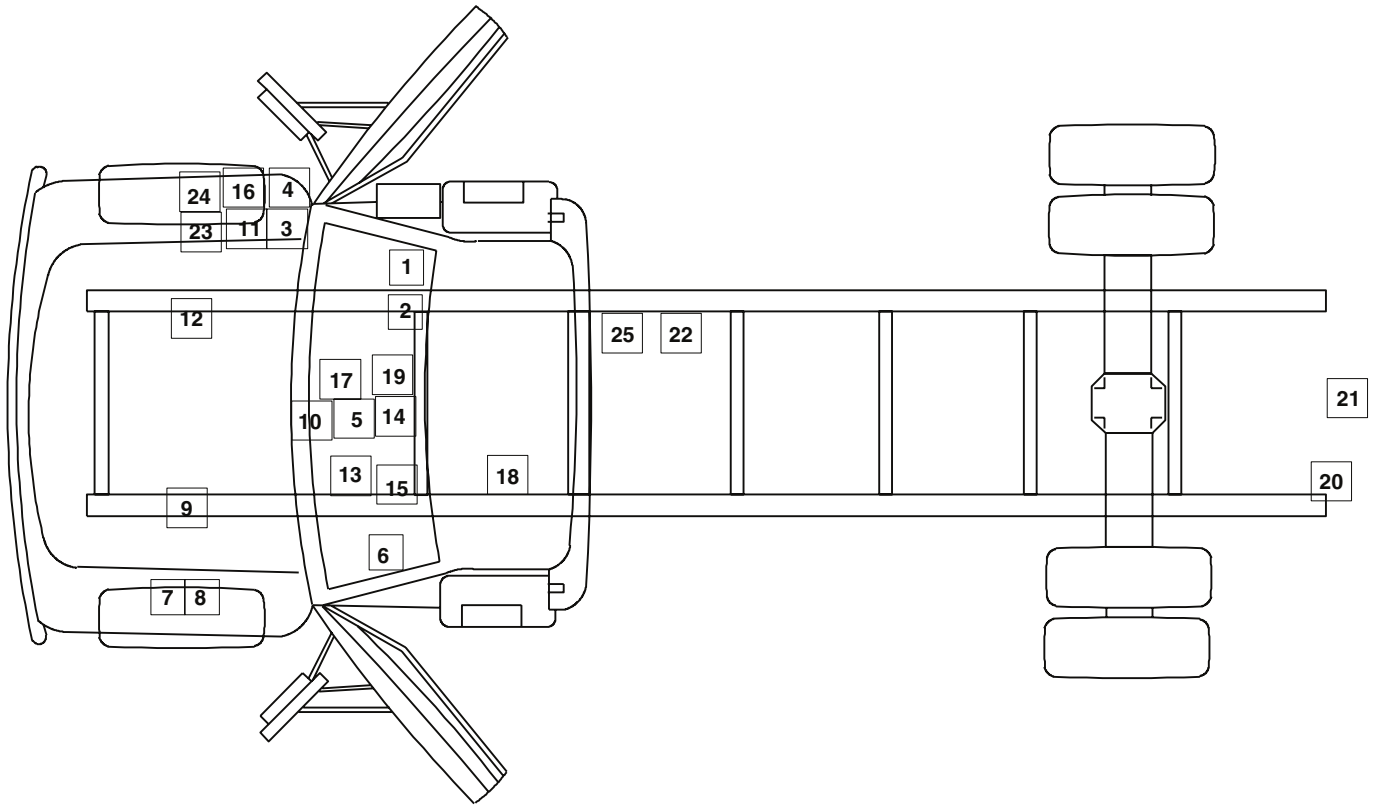


CIRCUIT SCHEMATIC



Electrical Component Legend

DATE	ESCR	L	DESCRIPTION
19OC00	N/A	A	MAJOR MODULE LOCATIONS



LOCATION LEGEND

1	IP DISTRIBUTION/RELAY CTR.
2	IP DISTRIBUTION CTR.
3	UNDERHOOD DISTRIBUTION CTR.
4	MAXI FUSE CTR.
5	CHIME/RADIO
6	DRL
7	EBC AIR/TCS
8	EBC HYD./TCS
9	ECU CAT. LG5
10	ECU ISZ LG4
11	ECU ISZ LB7
12	EDU ISZ LB7
13	ETC/PPS
14	HVAC
15	IPC
16	PCM/LCT TCM/WTEC TCM
17	RFA
18	SDM
19	TTM
20	TRAILER CONNECTOR FAM 2
21	TRAILER CONNECTOR FAM 3
22	BODY BUILDER CONNECTOR
23	TRANS OPTION CONNECTOR
24	PTO UPFITTER CONNECTOR
25	GROUND BLOCK

☐ PRELIM ☐ PROTO
☐ PROPOSAL ☒ PILOT
RELEASE LEVEL

Reference: h22m_ref_modules | OBJECT ID | REVISION 017 | STAGE X | VERSION 0 | LAST CHANGED BY | 9:06:20 am | ORGANIZATION 2003 Medium Duty C Series
PROJECT 03 2003 M. D. C Series | Panel Set: 1 schematic sheet1 7 SVEDWORK\h22m_ref_modules_.017 | Wednesday, July 18, 2001

—— WIRE
— — CLASS-2 ▬ ▬ J1939

(REFERENCE)
MAJOR MODULE LOCATIONS
GM Proprietary

FAMILY II:
JE3 : HYDRAULIC BRAKES
L18 : GMPT 8.1L V8 GAS
L87 : DURAMAX 6600 6.6L V8 DIESEL
M74/MTW : LCT 1000/2400 AUTO TRANS
ML6 : MANUAL TRANS

FAMILY III:
JE3 : HYDRAULIC BRAKES
JE4 : AIR BRAKES
L18 : GMPT 8.1L V8 GAS
LG4 : DURAMAX 7800 7.8L L6 DIESEL
LG5 : CATERPILLAR 7.2L L6 DIESEL
MX4/MTW : LCT 2000/2400 AUTO TRANS
MNK/MNZ/MP8/MTP - MD AUTO TRANS
MK9/MM7/MPU/MSC/MSG/MT3 : MANUAL TRANS
MK8/MK9/MKO/ML0/MS9/MUT/MM8 : MANUAL TRANS

FAMILY VALUES:

PAGE NO. 1a
PANEL 1 OF 1

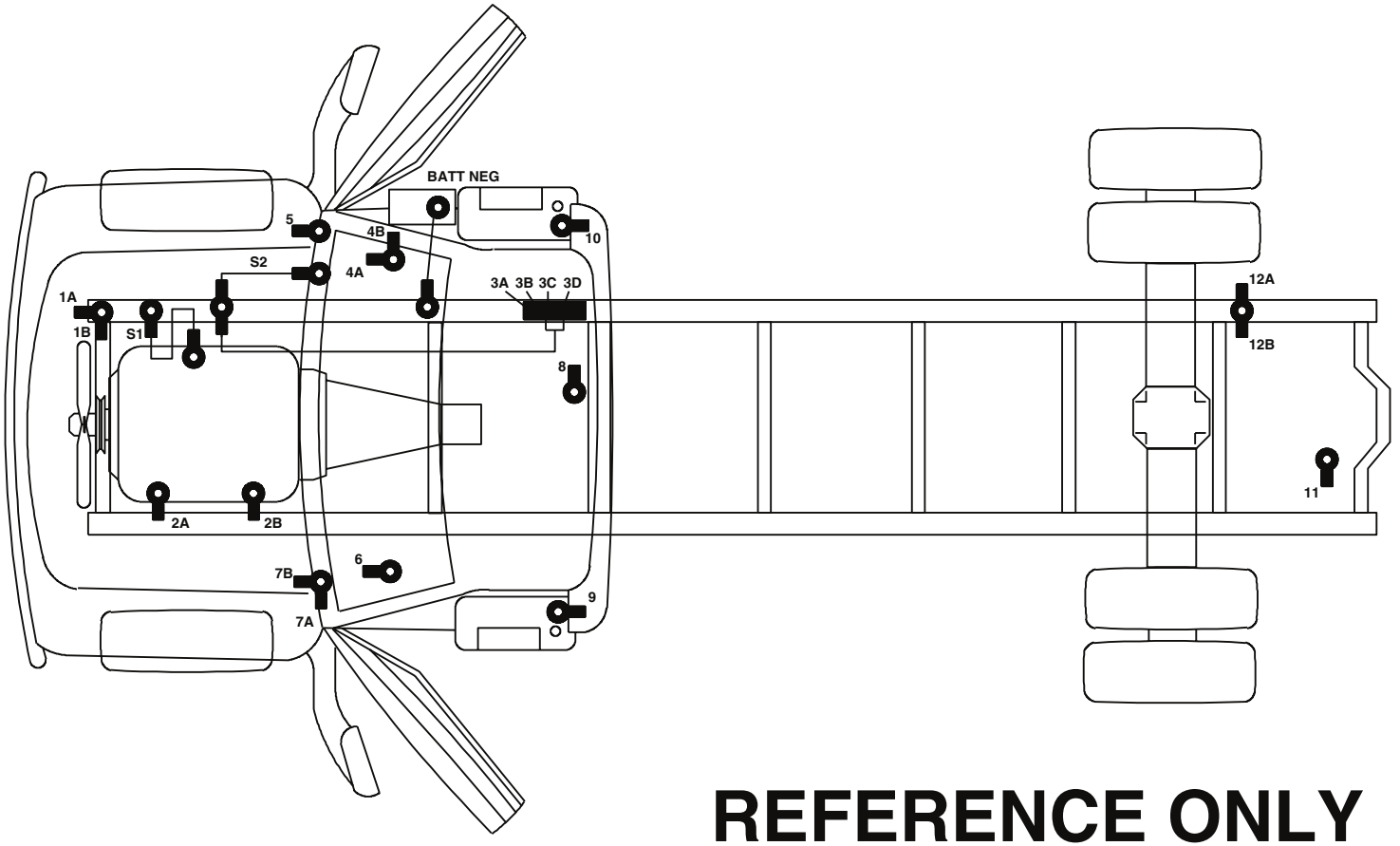
FAMILY II ☒
FAMILY III ☒

CHIME - CHIME MODULE
DLC - DATA LINK CONNECTOR
DRL - DAYTIME RUNNING LAMPS
DTC - DIAGNOSTIC TOOL CONNECTOR
EBC - ELECTRONIC BRAKE CONTROL
ECU - ENGINE CONTROL UNIT - L5
EDU - ELECTRONIC DRIVER UNIT
ETC - ELECTRONIC THROTTLE CONTROL
HVAC - HVAC MODULE
IPC - INSTRUMENT PANEL CLUSTER
LCT - LIGHT COMMERCIAL TRANS
PCM - POWERTRAIN CONTROL MODULE - V8
PPS - PEDAL POSITION SENSOR
RADIO - RADIO MODULE
RFA - REMOTE FUNCTION ACTUATOR
SDG - SERIAL DATA GATEWAY
SDM - SENSING & DIAGNOSTICS MODULE
TCM - TRANSMISSION CONTROL MODULE
TCS - TRACTION CONTROL SYSTEM
TTM - TELL TALE MODULE
WTEC - TCM FOR MD TRANS

Ground Zones

03 560 000	JG	PILOT B - INITIAL CREATION	21SE00	001
03 560 000	JG	Stacked Gnd Block Conn with S2	21SE00	001

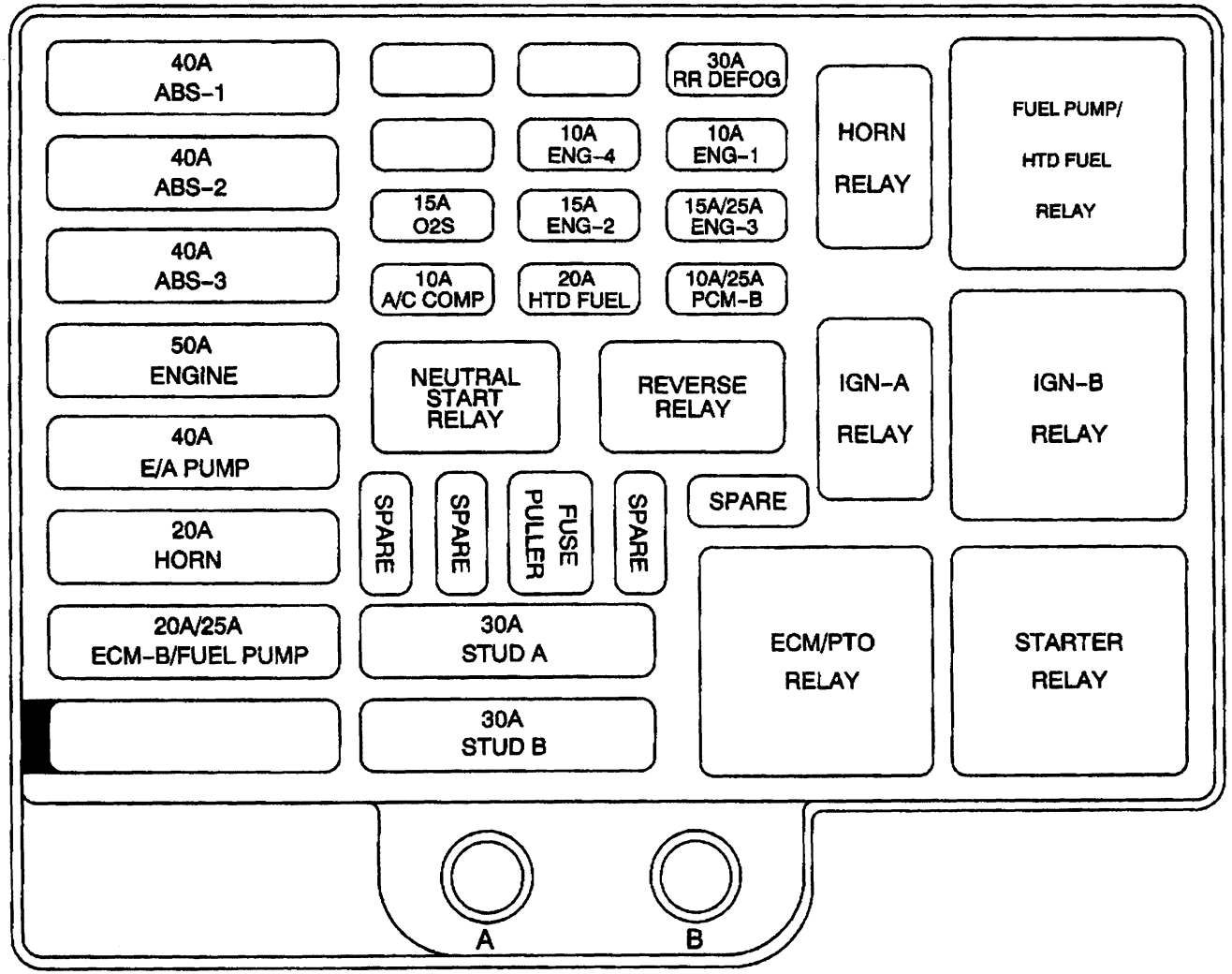
Ground Zones



REFERENCE ONLY

Ground Zones	OBJECT ID		REVISION	STAGE	VERSION	LAST CHANGED BY	4:14:11 pm	ORGANIZATION
2003 M. D. C Series 03 X	h22009a		003	Pilot	B			2003 Medium Duty C Series
Panel Set: 1 schematic sheet1 2	$IVEDWORK/h22009a__003					Thursday, September 21, 2000		Panel Set: 1

Fuse Block – Underhood (Primary) Label

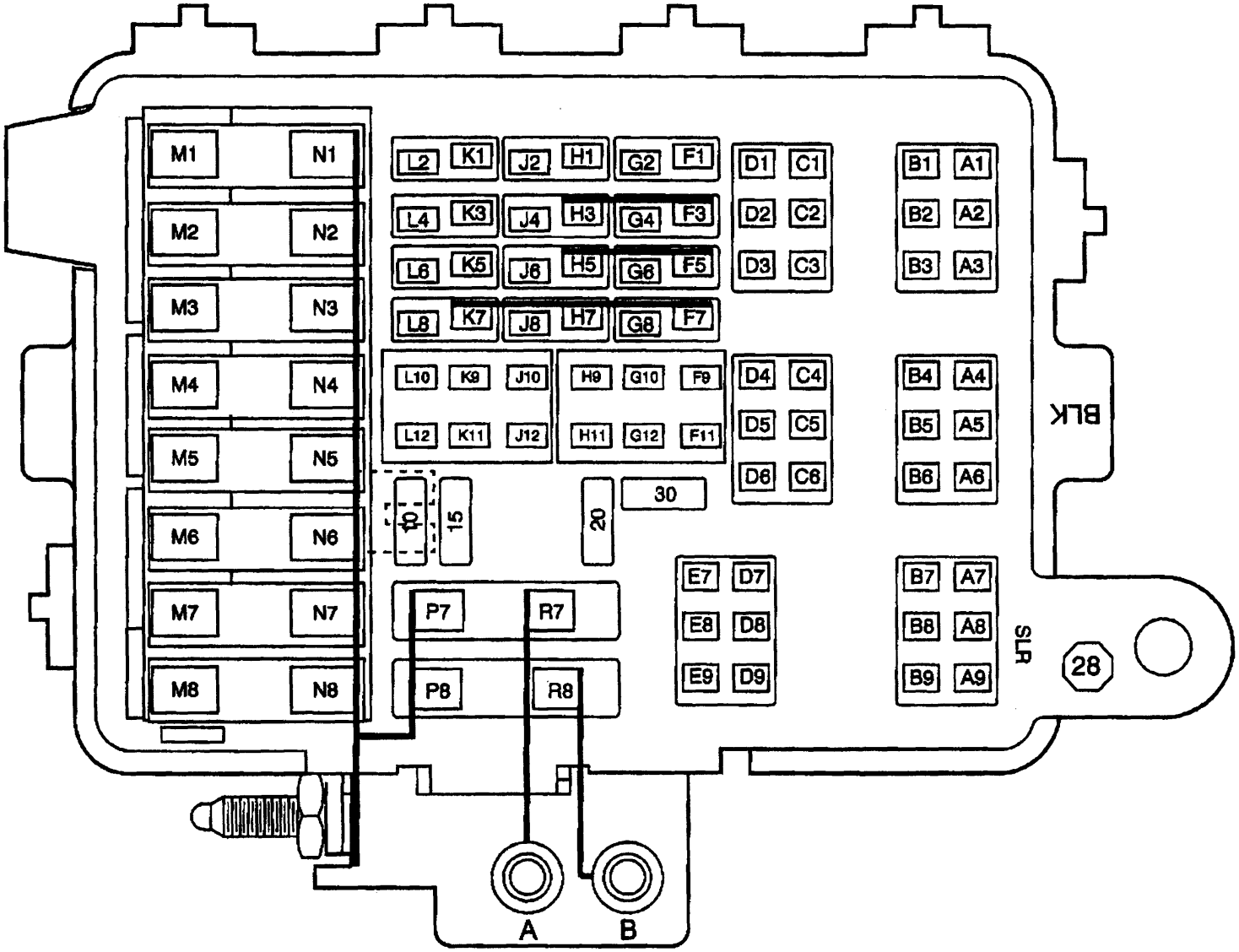


Fuse Block – Underhood (Primary) Label Usage

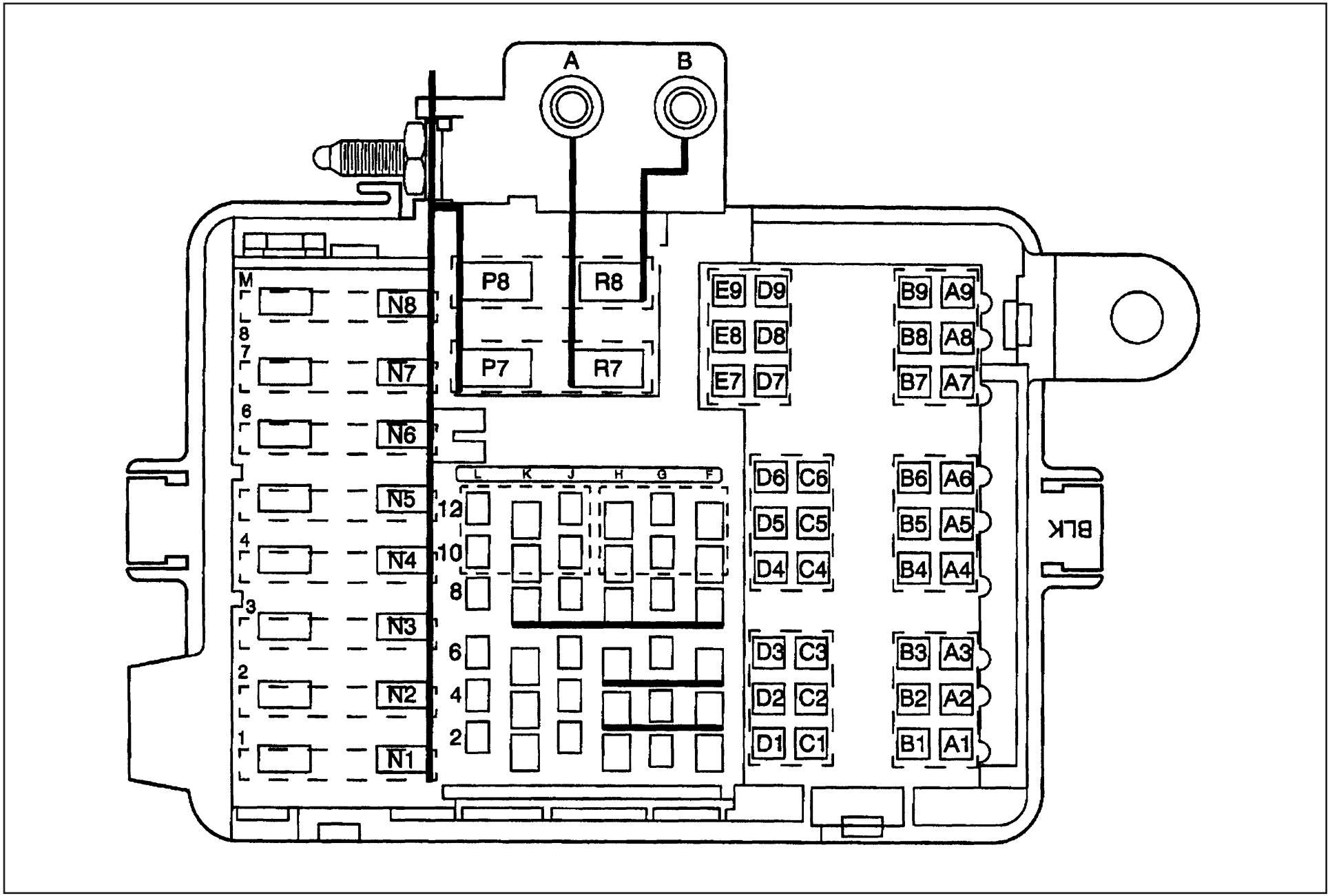
Device	Rating	Description
A/C COMP Fuse	10A	A/C Compressor
ABS-1 Fuse	40A	ABS
ABS-2 Fuse	40A	ABS
ABS-3 Fuse	40A	ABS
E/A PUMP Fuse	40A	Air Compressor (K16)
ECM RELAY (LF8/LF8)	--	Engine Control Module
ECM-B Fuse (LF6)	25A	Engine Control Module (ECM)
ECM-C (LF6)	25A	Engine Control Module (ECM)
ENG-1 Fuse	10A	PTO Switch (PTO), Overdrive Defeat Switch (Allison® LCT), Rear Axle Shift Motor - Two Speed (HPZ)
ENG-2 Fuse	15A	Engine Control Module (ECM) (LMM), Heated Fuel Relay (LF8/LF6), Exhaust Brake Relay (K40), Fuel Injectors/Ignition Coils (L18)
	30A	Engine Control Module (ECM) (LMM)
ENG-3 Fuse	15A	Fuel Injectors/Ignition Coils (L18), intake Air (IA) , Heater Relay (LF6), PTO Relay (PTO), Reverse Relay (Allison® MD)
ENG-4 Fuse (w/o LF6)	10A	Cruise Control Switch (K34)
ENGINE Fuse	50A	Ignition - A Relay, ignition - B Relay
FUEL Fuse (w/o LF6)	20A	Fuel Relay (LMM/L18), Not Used (LF8)
FUEL RELAY	--	Fuel pump (L18/LMM)

Device	Rating	Description
HORN Fuse	20A	Horn Relay
HORN RELAY	--	Horn
HTD FUEL Fuse	20A	Heated Fuel Relay (w/o L18/LF6)
IGN - A RELAY	--	Ignition
IGN - B RELAY	--	Ignition
NEUTRAL START RELAY	--	Neutral Start Relay (Allison® MD) (LF8)
O2S Fuse (L18)	15A	Heated Oxygen Sensor (HO2S) (L18)
PCM-B Fuse	10A (w/o LF8)	Serial Data Gateway (SDG), Powertrain Control Module (PCM) (L18), Engine Control Module (ECM) (w/o LF6), Transmission Control Module (TCM) (w/o LF6/LF8), Electric Shift Selector
	25A (LF8)	
PTO RELAY	--	Power Take-Off (PTO)
REVERSE RELAY (Allison® MD)	--	Backup Alarm (UZF), Backup Lamps
RR DEFOG Fuse	30A	HVAC Control Assembly Connector (C49)
SPARE Fuse	10A	Not Used
SPARE Fuse	15A	Not Used
SPARE Fuse	20A	Not Used
SPARE Fuse	30A	Not Used
STARTER RELAY	--	Starter Solenoid
STUD A Fuse	30A	AUX BODY B+ Upfitter Provision A
STUD B Fuse	30A	AUX BODY B+ Upfitter Provision B
TCM Fuse	15A	Transmission Control Module (TCM) (LF8)

Fuse Block – Underhood (Primary) Top View



Fuse Block – Underhood (Primary) Bottom View



Fuse Block – Underhood (Primary) Wire Entry

Connector Part Information

OEM: 12146281

Description: 86-Way Electrical Center (BK)

Terminal Part Information

Terminal/Tray: See Terminal Repair Kit

Core/Insulation Crimp: See Terminal Repair Kit

Release Tool/Test Probe: See Terminal Repair Kit

Pin	Wire Color	Circuit No.	Function
A1	PK	339	Ignition 1 Voltage (LF8/LF6)
	D-GN/WH	465	Fuel Pump Relay Control - Primary (L18/LMM)
A3	OG	1640	Battery Positive Voltage (L18/LMM)
	OG	1440	Fuel Injection Control (LF8/LF6)
A4	RD	1042	Battery Positive Voltage (LMM)
	PK	439	Ignition 1 Voltage (w/o LMM)
A6	RD	1042	Battery Positive Voltage
A7	PU	806	Crank Voltage
A9	RD	242	Battery Positive Voltage
B1	GY	120	Fuel Pump Supply Voltage (L18/LMM)
	PK	2677	Battery Positive Voltage (LF8/LF6)
B2	--	--	Not Used
B3	BK	250	Ground (w/o LF6/LF8)
B4	PU	2000	Ignition 1 Relay Output
B5	--	--	Not Used
B7	PU	6	Starter Solenoid Crank Voltage
B8	--	--	Not Used
B9	YE	447	Starter Relay Coil Control
C1	OG	740	Battery Positive Voltage
C3	OG	740	Battery Positive Voltage
C4	PK	439	Ignition 1 Voltage
C6	RD	1042	Battery Positive Voltage
D1	D-Gn	29	Horn Control
D2	--	--	Not Used
D3	BK	28	Horn Relay Control
D4	PU	2000	Ignition 1 Relay Output
D5	--	--	Not Used
D6	BK	250	Ground
D7	PK	539	Ignition 1 Voltage (LF6)
	L-GN	488	PTO On Switch - Signal (L18/LMM)
	OG	488	Battery Positive Voltage (LF8)
D9	PK	239	Ignition 1 Voltage (L18/LMM)
	WH	2561	PTO Supply Voltage (LF6)
	OG	440	Battery Positive Voltage (LF6/LF8)
E7	BK/WH	1120	Ignition 1 Voltage (LF8)
	WH	2561	PTO Supply Voltage (L18/LMM)
	D-GN/WH	2665	PTO Supply Voltage (LF6)
E8	--	--	Not Used
E9	L-GN	488	PTO On Switch - Signal (LF6)
	L-BU	1121	Battery Relay Output - Coil (LF8)
	PU	2562	PTO Control (L18/LMM)
F1	RD	1	Battery Positive Voltage

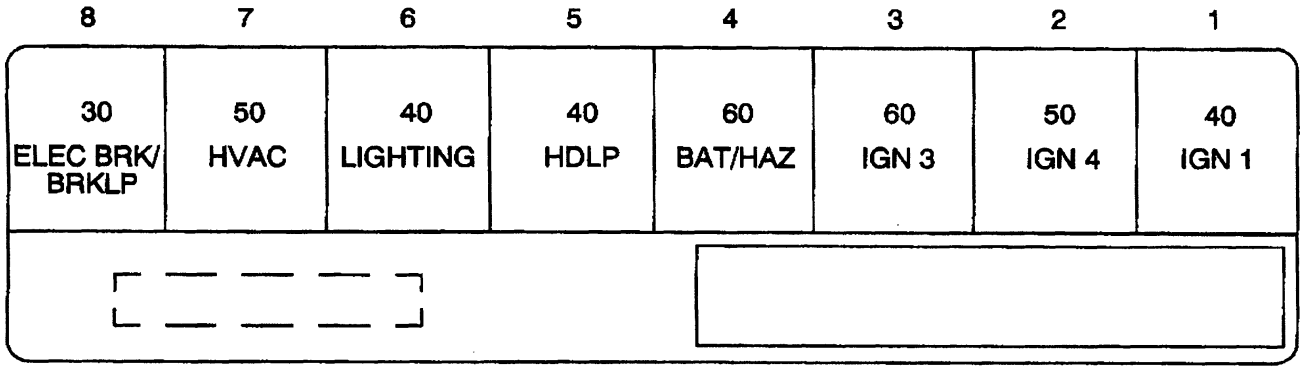
(continued on next page)

Fuse Block – Underhood (Primary) Wire Entry (continued)

(continued from previous page)

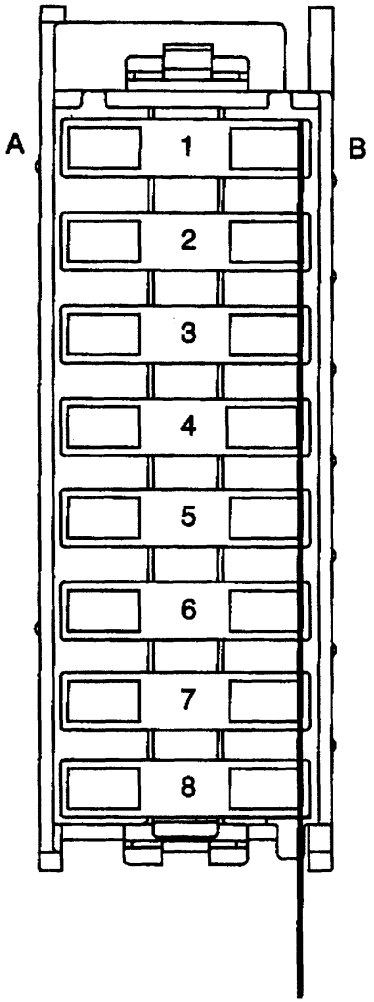
Pin	Wire Color	Circuit No.	Function
F3	--	2000	Ignition Voltage Bus (w/o LG5)
	PU	2000	Ignition Voltage (LG5)
F5	--	2000	Ignition Voltage Bus
F9	L-GN	24	Backup Lamp Supply Voltage (A/T)
F11	GY	1524	Backup Lamp Supply Voltage (A/T)
G2	PU	1093	Rear Defog Element Supply Voltage
G4	PK	239	Ignition 1 Voltage
G6	PK	539	Ignition 1 Voltage (w/o LMM)
G8	OG	440	Battery Positive Voltage
G10	--	--	Not Used
G12	--	--	Not Used
H1	--	--	Not Used
H3	PU	2000	Ignition Voltage
H5	PU	2000	Ignition Voltage
H7	RD	1	Battery Positive Voltage
H9	PK	539	Ignition 1 Voltage (Allison® MD)
	PK	139	Ignition 1 Voltage (Allison® LCT)
H11	PK	139	Ignition 1 Voltage (Allison® MD)
J2	OG	440	Battery Positive Voltage (LF8)
J4	PK	639	Ignition 1 Voltage (w/o LG5)
J6	PK	339	Ignition 1 Voltage
J8	OG	1440	Battery Positive Voltage (w/o L18)
J10	D-Gn	1433	Clutch Start Switch Signal (Allison® MD)
J12	YE	1479	A/T Neutral Signal (Allison® MD)
	OG	440	Battery Positive Voltage (LMM)
K1	--	--	Not Used
K3	--	--	Not Used
K5	--	--	Not Used
K7	--	--	Not Used
K9	BK	250	Ground (LMM)
K11	WH	2368	Cooling Fan Clutch Supply Voltage (LMM)
L2	--	--	Not Used
L4	--	--	Not Used
L6	OG	440	Battery Positive Voltage (LMM)
	PK	739	Ignition 1 Voltage (L18)
L8	OG	1240	Battery Positive Voltage
L10	BK	250	Ground (Allison® MD)
L12	PU	806	Crank Voltage (Allison® MD)
	WH/BK	2366	Colling Fan Clutch Control (LMM)
M1	RD	442	Battery Positive Voltage
M2	RD	1642	Battery Positive Voltage
M3	RD	42	Battery Positive Voltage
M4	RD	1042	Battery Positive Voltage
M5	OG	1840	Battery Positive Voltage
M6	OG	740	Battery Positive Voltage
	OG	740	Battery Positive Voltage
M7	OG	1640	Battery Positive Voltage (L18/LLY/LMM)
	OG	1540	Battery Positive Voltage (LG5
M8	OG	1540	Battery Positive Voltage
N1-N8	--	1	Battery Positive Voltage Bus
P7	--	1	Battery Positive Voltage Bus
P8	--	1	Battery Positive Voltage Bus
R7	--	--	Battery Positive Voltage (AUX BODY B+ Upfitter Provision Stud A)
R8	--	--	Battery Positive Voltage (AUX BODY B+ Upfitter Provision Stud B)

Fuse Block – Underhood (Secondary) Label

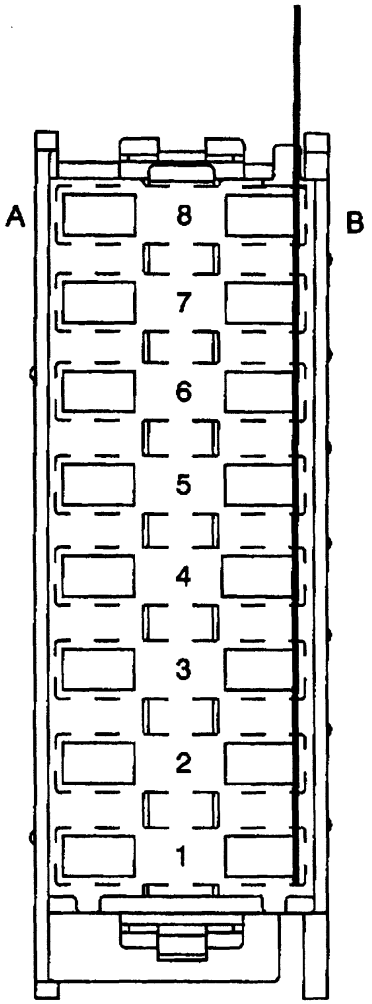


No.	Device	Rating	Description
1	IGN 1 Fuse	40A	Ignition Switch, Starter Relay, Transfer Case Shift Control Module (NP1)
2	IGN 2 Fuse	50A	Ignition 4 Relay
3	IGN 3 Fuse	60A	Ignition Switch
4	BAT/HAZ Fuse	60A	Fuse Block - I/P
5	HDLP Fuse	40A	Headlamp Switch, Fuse Block - I/P
6	LIGHTING Fuse	40A	Courtesy Fuse, Park Fuse
7	HVAC Fuse	50A	Blower Motor Resistor Assembly (C40/C60)
8	ELEC BRK/ BRKLP Circuit Breaker	30A	Brake Lamps (C6/C7/C8)
			Electronic Brake Control Module (EBCM) (C4/C5)

Fuse Block – Underhood (Secondary) Top View



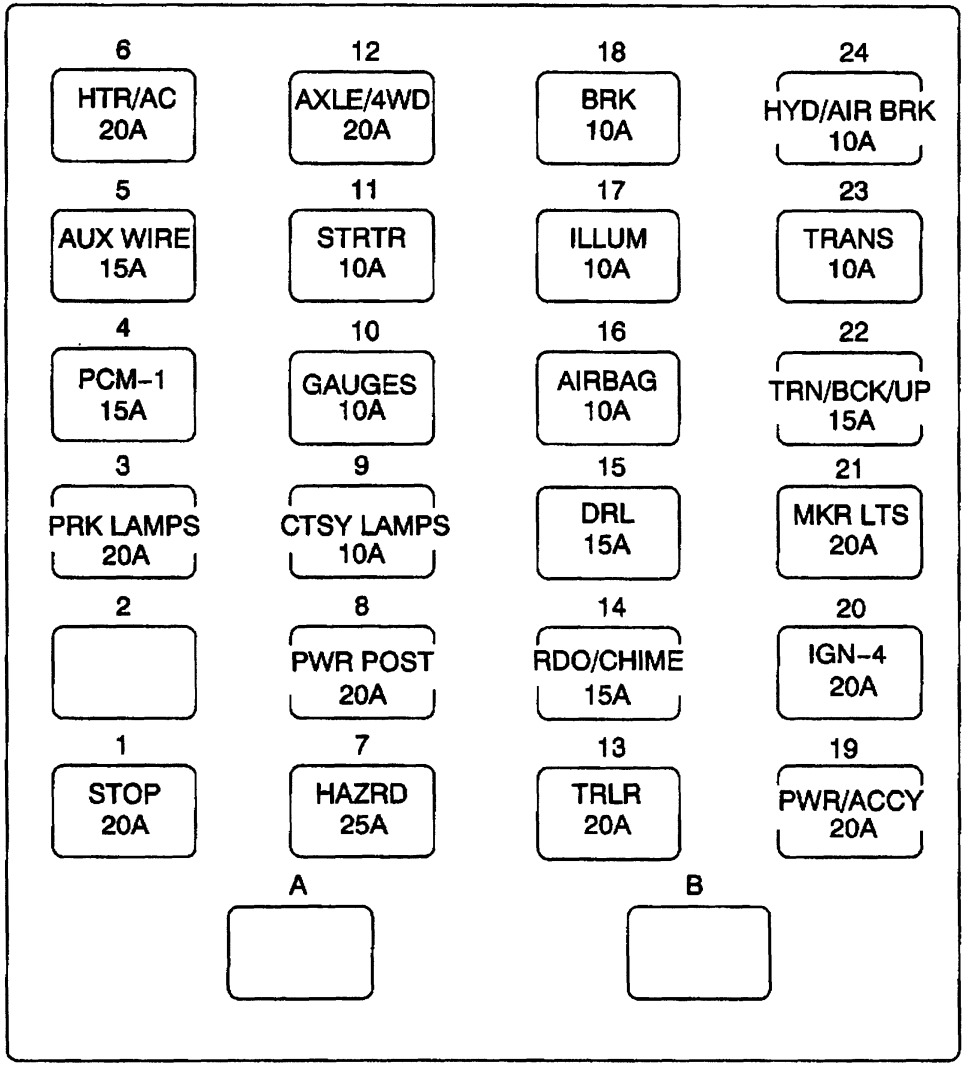
Fuse Block – Underhood (Secondary) Bottom View



Fuse Block – Underhood (Secondary) Wire Entry

Connector Part Information			
OEM: 12092231			
Description: 16-Way Fuse Block Component (BK)			
Terminal Part Information			
Terminal/Tray: See Terminal Repair Kit			
Core/Insulation Crimp: See Terminal Repair Kit			
Release Tool/Test Probe: See Terminal Repair Kit			
Pin	**Wire Color**	**Circuit No.**	**Function**
A1	RD	242	Battery Positive Voltage
A2	RD	1242	Battery Positive Voltage
A3	RD	342	Battery Positive Voltage
A4	RD	142	Battery Positive Voltage
A5	RD	1142	Battery Positive Voltage
A6	RD	1342	Battery Positive Voltage
A7	RD	542	Battery Positive Voltage
A8	RD	642	Battery Positive Voltage (C4/C5)
		1542	Battery Positive Voltage (RQ2 & U86/RQ3)

Fuse Block – I/P-1 Label



Fuse Block – I/P-1 Label Usage

Fuse No.	Device	Rating	Description
1	STOP Fuse/ Circuit Breaker	20A	Stop Lamp Switch, Trailer Stop Lamp Switch
2	--	--	Not Used
3	PRK LAMPS Fuse/Circuit Breaker	20A	Headlamp Switch, Transfer Case Shift Control Switch (NP1)
4	PCM-1 Fuse/ Circuit Breaker	15A	Electronic Brake Control Module (EBCM), Powertrain Control Module (PCM) (L18), Engine Control Module (ECM) (LG4/LG5/LLY), Throttle Actuator Control (TAC) Module (L18)
5	AUX WIRE Fuse/Circuit Breaker	15A	HTD MIR Relay, DRL Module, Upfitter Connector
6	HTR/AC Fuse/ Circuit Breaker	20A	Air Temperature Actuator (C40/C60), Vacuum Pump (w/o L18), HVAC Control Assembly (C40/C60), Blower Motor Relay - Auxiliary (C36)
7	HAZRD Fuse/ Circuit Breaker	25A	Turn Signal/Multifunction Switch
8	PWR POST Fuse/Circuit Breaker	20A	Cigar Lighter (DT4), Controller Area Network (CAN) Connector, Auxiliary Power Outlet 1, Auxiliary Power Outlet 2, Data Link Connector (DLC)
9	CTSY LAMPS Fuse/Circuit Breaker	10A	Dome Lamps
10	GAUGES Fuse/ Circuit Breaker	10A	Remote Control Door Lock Receiver (RCDLR) (AU0), Headlamp Switch, Daytime Running Lights (DRL) Relay, Gauge Center, Driver Information Center (DIC), Instrument Panel Cluster (IPC)
11	STRTR Fuse/ Circuit Breaker	10A	Starter Relay, Clutch Start Switch (M/T), Park/Neutral Position (PNP) Switch (Allison® LCT), Neutral Start Relay (Allison® MD), Electronic Brake Control Module (EBCM)
12	AXLE/4WD Fuse/ Circuit Breaker	20A	Rear Axle Shift Relay - Two Speed (HPZ)
13	TRLR Fuse/ Circuit Breaker	20A	LT TRN TRLR Relay, RT TRN TRLR Relay
14	RDO/CHIME Fuse/Circuit Breaker	15A	Radio, Chime Module (UL5/UXZ), Instrument Panel Cluster (IPC)
15	DRL Fuse/ Circuit Breaker	15A	Daytime Running Lights (DRL) Diode
16	AIRBAG Fuse/ Circuit Breaker	10A	Inflatable Restraint I/P Module (AK5), Inflatable Restraint Sensing and Diagnostic Module (SDM) (AJ3/AK5)

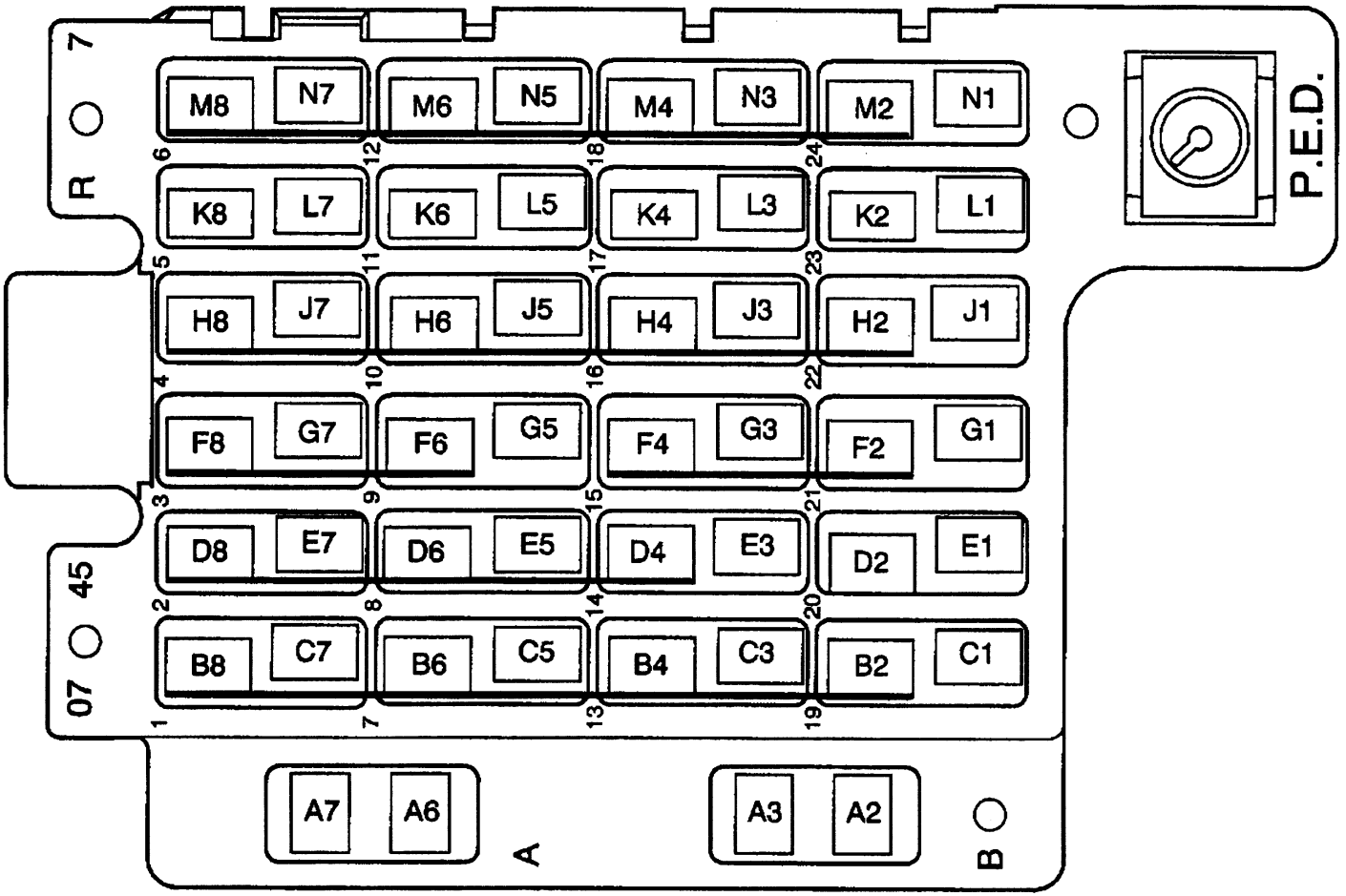
(continued on next page)

Fuse Block – I/P-1 Label Usage (continued)

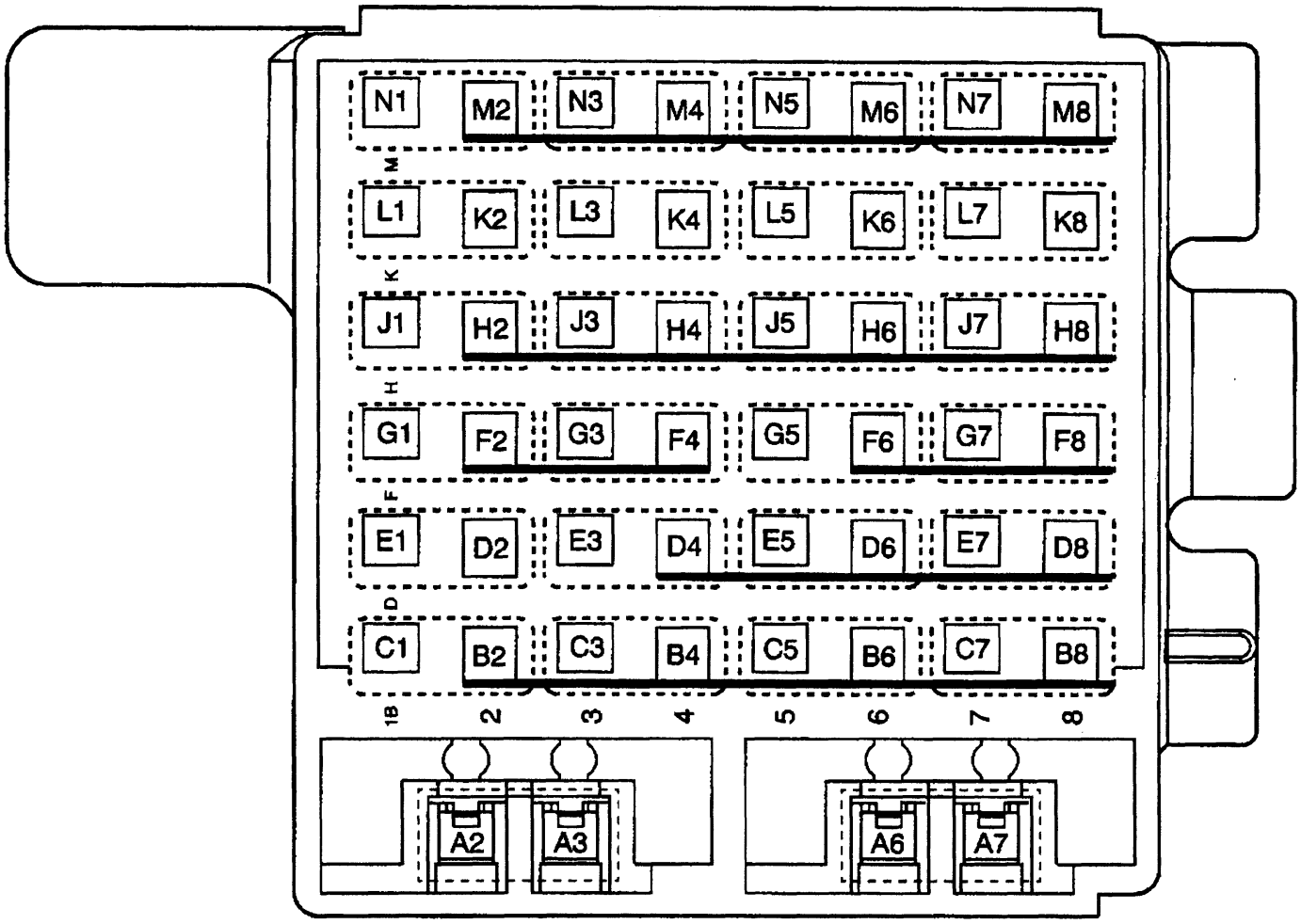
(continued from previous page)

Fuse No.	Device	Rating	Description
17	ILLUM Fuse/ Circuit Breaker	10A	IPC, Radio, HVAC Control Assembly, A/T Shift Lever Position Indicator
18	BRK Fuse/ Circuit Breaker	10A	A/C Compressor Clutch Relay (C60), High Idle Switch (UF3). Clutch Pedal Position (CPP) Switch (M/T), ABS Relay (JE4), Stop Lamp Switch
19	PWR/ACCY Fuse/Circuit Breaker	20A	Blower Motor Relay - Auxiliary (C49), Outside Rearview Mirror - Driver (DB6/ DB7/DB8), Outside Rearview Mirror - Passenger (DB6/DB7/DB8), Door Lock Switch - Driver (AU3), Door Lock Switch - Passenger (AU3), Remote Control Door Lock Receiver (RCDLR) (AU0)
20	ICN - 4 Fuse/ Circuit Breaker	20A	Instrument Panel Cluster (IPC), Wind-shield Wiper Motor, Turn Signal/ Multifunction Switch, IGN-4 Relay
21	MKR LTS Fuse/ Circuit Breaker	25A	MKR LTS Relay
22	TRN/BCK/UP Fuse/Circuit Breaker	15A	Reverse Relay (Allison® MD),Backup Lamp Switch (M/T), Turn Signal/ Multifunction Switch
23	TRANS Fuse/ Circuit Breaker	10A	Instrument Panel Cluster (IPC), SDG Module, TCM, ECM, PCM
24	HYD/AIR BRK Fuse/Circuit Breaker	10A	Low Air Pressure Switch, Air Brake Dryer (JE4/JTU), Traction Control Switch (NW9), Air Suspension Dump Switch (G40/G45/GSJ)
A-B	--	--	Not Used

Fuse Block – I/P-1 Front View



Fuse Block – I/P-1 Back View



Fuse Block – I/P-1 Wire Entry

Connector Part Information

OEM: 12110746

Description: 48-Way Metri-Pack 280 Series (BK)

Terminal Part Information

Terminal/Tray: See Terminal Repair Kit

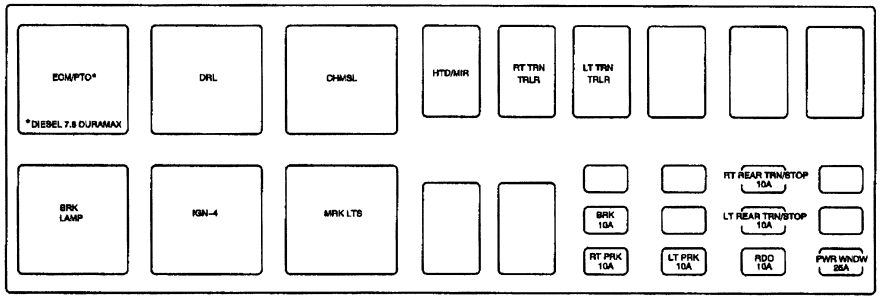
Core/Insulation Crimp: See Terminal Repair Kit

Release Tool/Test Probe: See Terminal Repair Kit

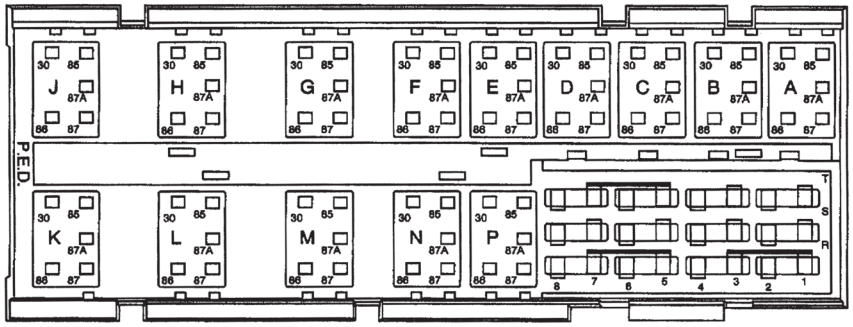
Pin	Wire Color	Circuit No.	Function
A2-A3	--	--	Not Used
A6-A7	--	--	Not Used
B2	--	142	Battery Positive Voltage Bus
B4	RD	142	Battery Positive Voltage
B6	--	142	Battery Positive Voltage Bus
B8	--	142	Battery Positive Voltage Bus
C1	OG	540	Battery Positive Voltage
C3	OG	640	Battery Positive Voltage
C5	OG	1040	Battery Positive Voltage
C7	OG	140	Battery Positive Voltage
D2	BN	4	Accessory Voltage
D4	--	142	Battery Positive Voltage Bus
D6	RD	142	Battery Positive Voltage
D8	--	142	Battery Positive Voltage Bus
E1	YE	43	Accessory Voltage
E3	OG	1140	Battery Positive Voltage
E5	OG	840	Battery Positive Voltage
E7	--	--	Not Used
F2	--	1142	Battery Positive Voltage Bus
F4	RD	1142	Battery Positive Voltage
F6	--	1342	Battery Positive Voltage Bus
F8	RD	1342	Battery Positive Voltage
G1	OG	1340	Battery Positive Voltage
G3	OG	340	Battery Positive Voltage
G5	OG	40	Battery Positive Voltage
G7	OG	240	Battery Positive Voltage
	BN	241	Ignition 3 Voltage (NP1)
H2	--	3	Ignition 1 Voltage Bus
H4	PK	3	Ignition 1 Voltage
H6	--	3	Ignition 1 Voltage Bus
H8	--	3	Ignition 1 Voltage Bus
J1	PK	139	Ignition 1 Voltage
J3	YE	1139	Ignition 1 Voltage
J5	PK	39	Ignition 1 Voltage
J7	PK	439	Ignition 1 Voltage
K2	WH	1390	Off Run Crank Voltage
K4	D-GN	44	Instrument Panel Lamps Dimmer Switch Signal
K6	YE	5	Crank Voltage
K8	OG	300	Ignition 3 Voltage
L1	PK	1020	Off Run Crank Voltage
L3	GY	8	Instrument panel Lamp Supply Voltage 1
L5	PU	806	Crank Voltage
L7	BN	641	Ignition 3 Voltage
M2	--	300	Ignition 3 Voltage Bus
M4	OG	300	Ignition 3 Voltage
M6	--	300	Ignition 3 Voltage Bus
M8	--	300	Ignition 3 Voltage Bus
N1	BN	541	Ignition 3 Voltage
N3	BN	441	Ignition 3 Voltage
N5	BN	241	Ignition 3 Voltage (C6/C7/C8)
N7	GY	141	Ignition 3 Voltage

Fuse Block – I/P-2 Label

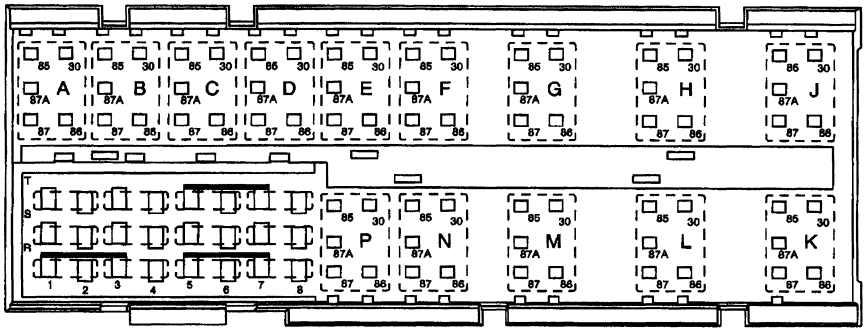
Device	Rating	Description
BRK Circuit Breaker	10A	Brake Warning Lamp, CHMSL Relay
BRK LAMP Relay	--	Trailer Stop Lamps (RQ2/U86/RQ3)
CHMSL Relay	--	Brake Lamps (C4/C5), Tractor/Trailer Wiring (C6/C7/C8)
DRL Relay	--	Daytime Running Lights (DRL)
ECM Relay	--	Engine Control Module (ECM) (w/o LG4)
HTD MIR Relay	--	Outside Rearview Mirror - Driver (DB6/DB7/DB8), Outside Rearview Mirror - Passenger (DB6/DB7/DB8)
IGN-4 Relay	--	Ignition
LT PARK Circuit Breaker	10A	Left Parking Lamps
LT REAR TRN/STOP Circuit Breaker	10A	Transfer Case Shift Control Switch (NP1)
LT TRN TRLR Relay	--	Left Trailer Turn Signal
MKR LTS Relay	--	Side Marker and Clearance Lamps
PTO Relay	--	Power Take-Off (LG4/PTO)
PWR WNDW Circuit Breaker	25A	Power Windows
RDO Circuit Breaker	10A	Radio Blunt Cut
RT PARK Circuit Breaker	10A	Right Parking Lamps
RT REAR TRN/STOP Circuit Breaker	10A	Right Rear Trailer Wiring
RT TRN TRLR Relay	--	Right Trailer Turn Signal



Fuse Block – I/P-2
Front View



Fuse Block – I/P-2
Back View



Fuse Block – I/P-2 Wire Entry

Connector Part Information

OEM: 12129833

Description: 94-Way F Fuse Block (BK)

Terminal Part Information

Terminal/Tray: See Terminal Repair Kit

Core/Insulation Crimp: See Terminal Repair Kit

Release Tool/Test Probe: See Terminal Repair Kit

Pin	Wire Color	Circuit No.	Function
A30	--	--	Not Used
A85	--	--	Not Used
A86	--	--	Not Used
A87	--	--	Not Used
A87A	--	--	Not Used
B30	--	--	Not Used
B85	--	--	Not Used
B86	--	--	Not Used
B87	--	--	Not Used
B87A	--	--	Not Used
C30	--	--	Not Used
C85	--	--	Not Used
C86	--	--	Not Used
C87	--	--	Not Used
C87A	--	--	Not Used
D30	YE	318	Left Rear Trailer Stop Turn Lamp Supply Voltage
D85	YE	618	Left Rear Turn Signal Lamp Supply Voltage (C6/C7/C8)
	L-BU	14	Left Turn Signal Status Signal (C6/C7/C8)
D86	BK	450	Ground
E30	D-GN	319	Right Rear Trailer Stop Turn Lamp Supply Voltage
E85	D-GN	619	Right Rear Turn Signal Lamp Supply Voltage (C4/C5)
	D-GN	15	Right Turn Signal Status Signal (C6/C7/C8)
E86	BK	450	Ground
E87	OG	640	Battery Positive Voltage
E87A	--	--	Not Used
F30	OG	267	Heated Mirror Supply Voltage
F85	BK	450	Ground
F86	OG	267	Heated Mirror Supply Voltage
F87	BN	641	Ignition 3 Voltage
F87A	--	--	Not Used
G30	WH	17	Stop Lamp Supply Voltage
G85	BK	450	Ground
G86	L-BU	1320	Stop Lamp Supply Voltage
G87	YE	895	Left Rear Stop Lamp Supply Voltage
G87A	--	--	Not Used
H30	TN	12	Headlamp Low Beam Supply Voltage
H85	L-GN/BK	592	Daytime Running Lights (DRL) Relay Control
H86	PK	39	Ignition 1 Voltage
H87	YE	634	DRL Diode Supply Voltage
H87A	PU	544	Headlamp Low Beam Supply Voltage
J30	BK/WH	1120	ECM Power (w/o LF8)
	WH	2561	PRO Supply Voltage (LF8/PTO)

(continued on next page)

Fuse Block – I/P-2 Wire Entry (continued)

(continued from previous page)

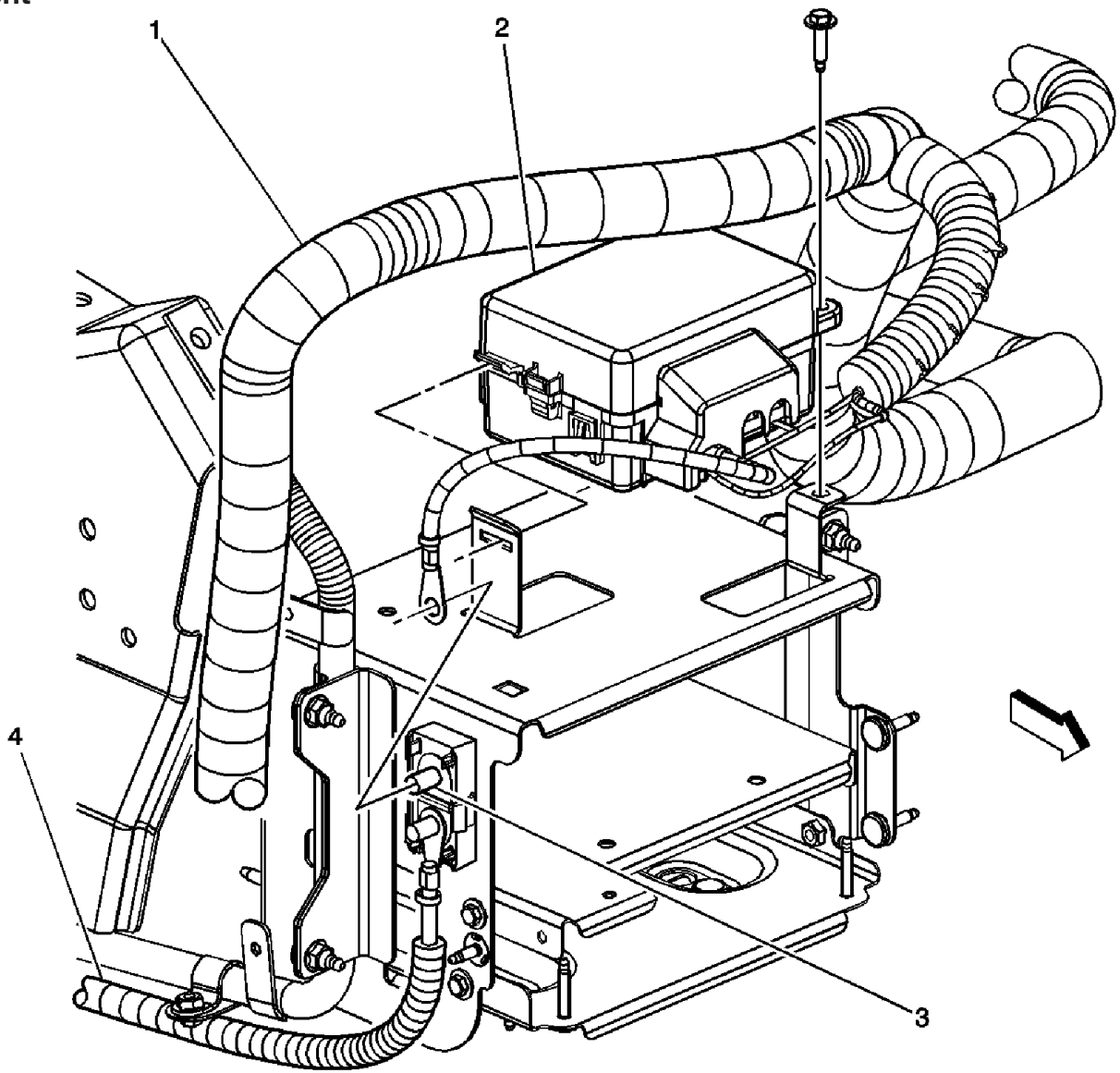
Pin	Wire Color	Circuit No.	Function
J85	OG	440	Battery Positive Voltage (w/o LF8)
	L-GN	488	PRO On Switch - Signal (LF8)
J86	L-BU	1121	ECM Power Enable (w/o LF8)
	PU	2562	PTO Supply Voltage (LF8)
J87	OG	440	Battery Positive Voltage (w/o LF8)
	PK	539	Ignition 1 Voltage (LF8)
J87A	--	--	Not Used
K30	RD	1411	Trailer Stop Relay-Contact-N.O.
K85	L-BU	1320	Stop Lamp Supply Voltage
K86	BK	450	Ground
K87	RD	1542	Battery Positive Voltage
K87A	--	--	Not Used
L30	BK	755	RAP Relay Coil Control
L85	YE	43	Accessory Voltage
L86	BK	450	Ground
L87	RD	1242	Battery Positive Voltage
L87A	--	--	Not Used
M30	OG	1340	Battery Positive Voltage
M85	OG/BK	2666	Ignition 1 Voltage
M86	BN/WH	2609	Right Rear Park Lamps Supply Voltage
M87	D-GN	21	Marker Lamps Supply Voltage
M87A	--	--	Not Used
N30	PK	2677	Battery Positive Voltage
N85	PK	239	Ignition 1 Voltage
N86	BK	450	Ground
N87	OG	1440	Battery Positive Voltage
N87A	--	--	Not Used

Pin	Wire Color	Circuit No.	Function
P30	GY	5481	Ground
P85	BK/WH	1120	Ground
P86	BN	5347	Ground
P87	BK/WH	1120	Ground
P87A	--	--	Not Used
R1	BK	755	Battery Positive Voltage
R2	YE	343	Accessory Voltage
R3	--	755	Battery Positive Voltage Bus
R4	OG	2040	Battery Positive Voltage
R5	BN	9	Park Lamp Supply Voltage
R6	BN	2509	Left Rear Park Lamps Supply Voltage
R7	--	9	Park Lamp Supply Voltage Bus
R8	BN/WH	2609	Right Rear Park Lamps Supply Voltage
S1-S2	--	--	Not Used
S3	YE	18	Left Rear Stop Turn Lamp Supply Voltage
S4	YE	618	Left Rear Turn Signal Lamp Supply Voltage
S5-S6	--	--	Not Used
S7	WH	17	Stop Lamp Switch Signal
S8	L-BU	1320	Stop Lamp Supply Voltage
T1-T2	--	--	Not Used
T3	D-GN	19	Right Rear Stop Turn Lamp Supply Voltage
T4	D-GN	619	Right Rear Turn Signal Lamp Supply Voltage
T5-T8	--	--	Not Used

Location Views – U/H Fuse Center

Back Right of Engine Compartment

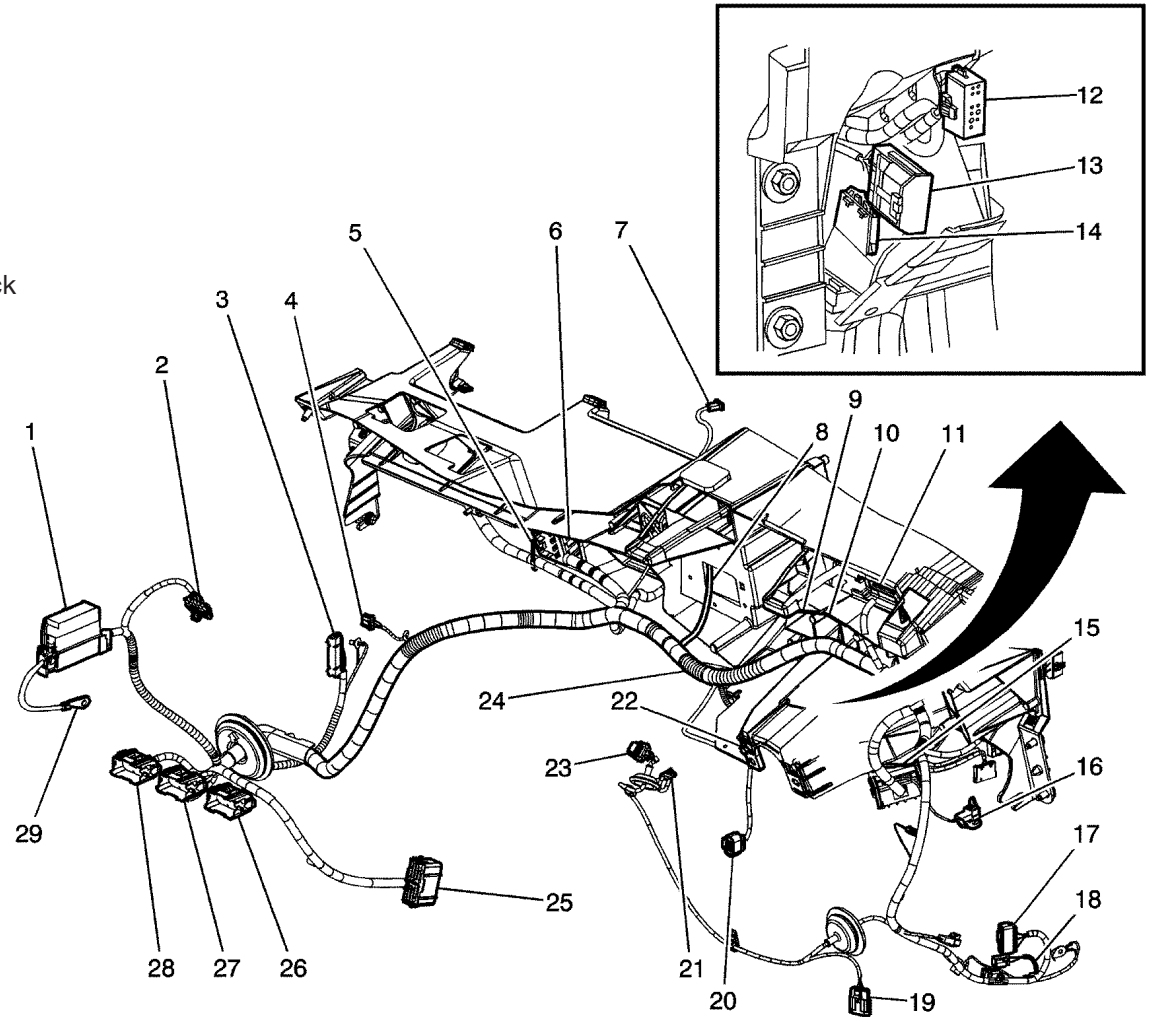
(1) Engine Harness
(2) Fuse Block - Underhood
(3) Remote Battery Stud
(4) Positive Battery Cable



Location Views – I/P Harness w/IP-1 & IP-2

I/P Harness

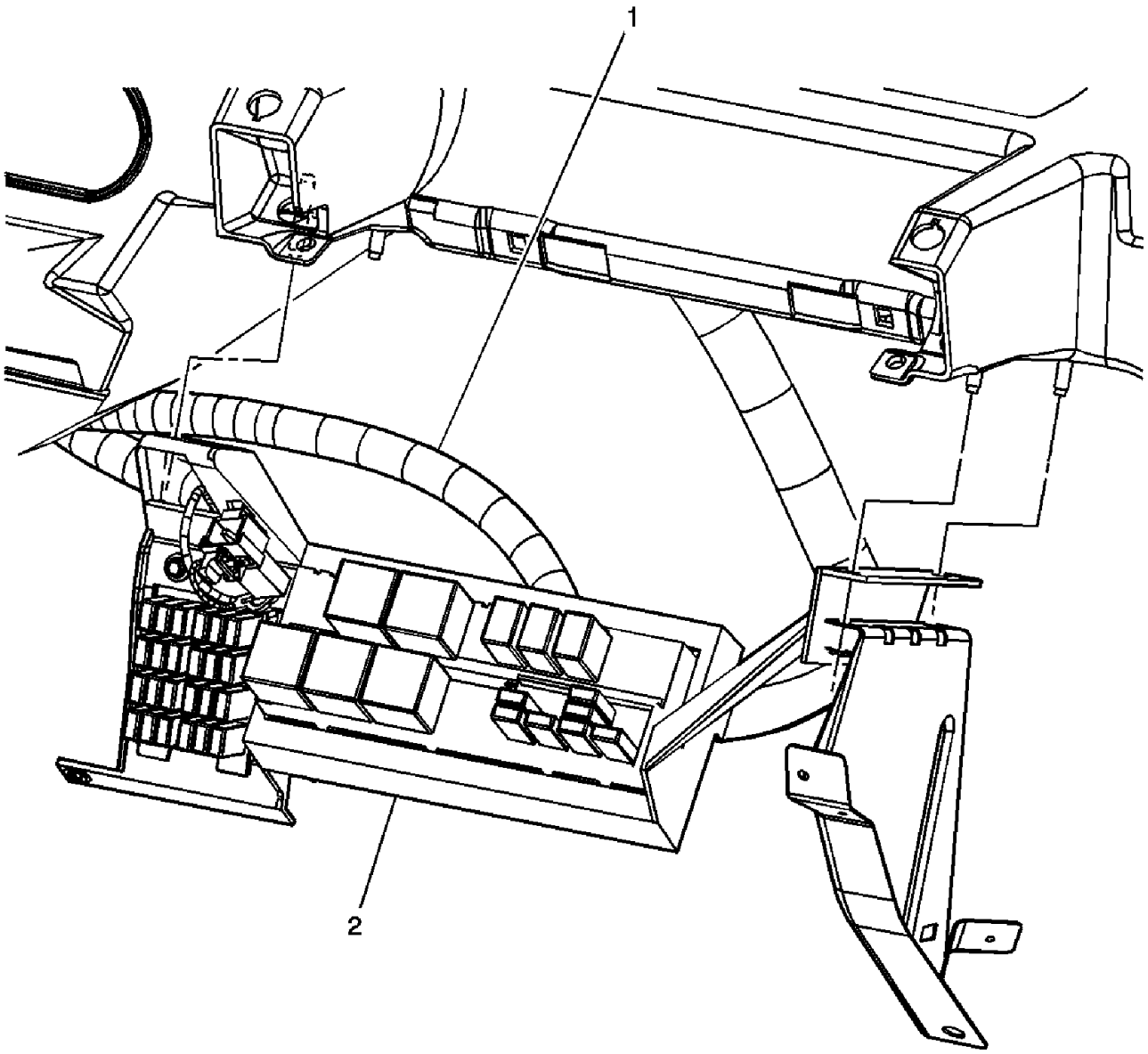
(1) Fuse Block - Underhood (Secondary)
(2) Blower Motor Resistor Assembly (C40/C60)
(3) X207 (30 cavities)
(4) Inflatable Restraint I/P Module (AK5)
(5) Fuse Block - I/P - 1
(6) Fuse Block - I/P - 2
(7) Air Brake Pressure Gauge Lamp (JE4), Differential Lock Switch Lamp (HNB/HPL/HPN), Inter-Axle Differential Lock Switch Lamp (Tandem Axle), Rear Axle Driver Control Switch Lamp - Two Speed (HR1/Automatic Transmission)
(8) HVAC Control Assembly (C40/C60)
(9) Turn Signal/Hazard Flasher Module
(10) Daytime Running Lights (DRL) Diode
(11) Instrument Panel Cluster (IPC)
(12) Headlamp Switch
(13) Daytime Running Lights (DRL) Module
(14) JX 203 (12 cavities)
(15) X201 (48 cavities)
(16) Inflatable Restraint Steering Wheel Module (AJ3/AK5)
(17) X211 (22 cavities)
(18) X215 (8 cavities)
(19) X150 (4 cavities)
(20) Accelerator Pedal Position (APP) Sensor
(21) Radio
(22) Serial Data Gateway (SDG)
(23) Driver Information Center (DIC)
(24) Engine Control Module
(25) X126 (40 cavities)
(26) X109 (40 cavities)
(27) X200
(28) X118



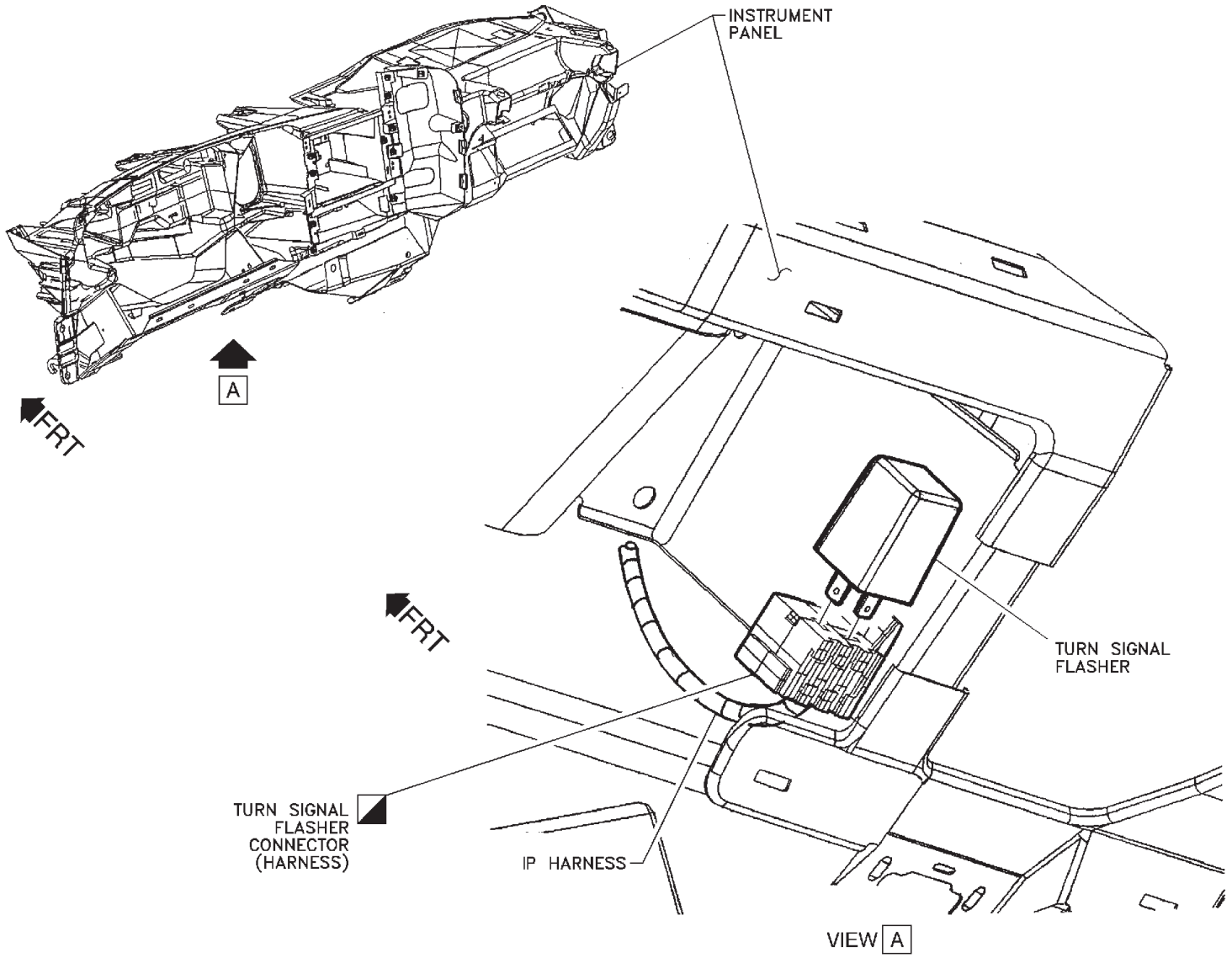
Location Views – I/P-2 Fuse Center

Lower Right I/P

(1) I/P Harness
(2) Fuse Block - I/P - 2



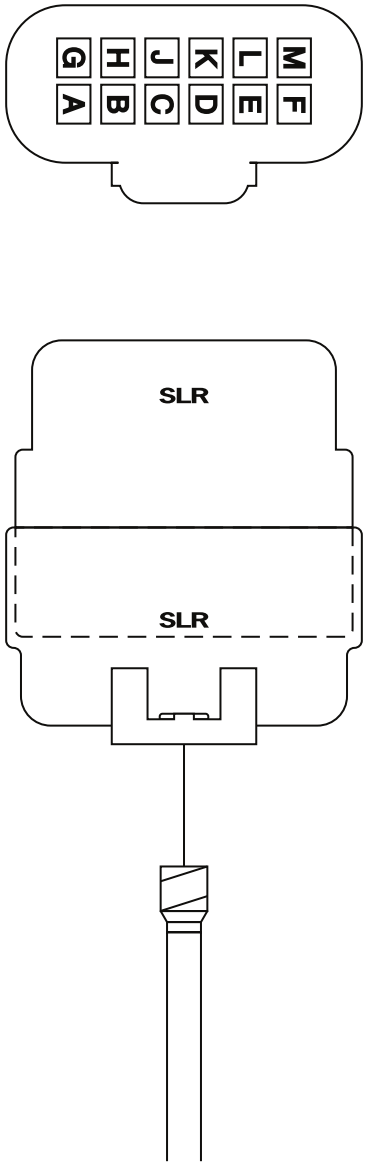
Turn Signal Flasher



12-Way Body Builder Connector

	TRUCK SIDE	BODY BUILDER SIDE	
Connector	Packard 280 Series		
Typical connector	PPN 15326910 (F)	PPN 15326915 (M)	SPN 15326915
Typical terminal	PPN 15304719	PPN 15304731	SPN 15304731
Typical cable seal	PPN 12191221	PPN 12191232	SPN 15366065

Pin	Wire		Function
	Ckt#	Color	
A	1827	YEL/BLK	128,000 Pulses/Mile*
B	2609	BRN/WHT	Right Park Lamp
C	318	YEL	Lt Stop/Turn (Fam2), Lt Turn (Fam3)
D	2509	BRN	Lt Park Lamp
E	1320	BLU LT	Stop
F	641	BRN	IGN 3 15A
G	21	GRN DK	Marker Lamp 20A
H	350	BLK	GND Zone 3B
J	TBD	–	Spare
K	319	GRN DK	Rt Stop/Turn (Fam2), Rt Turn (Fam3)
L	24	GRN LT	Back Up
M	TBD	–	Spare

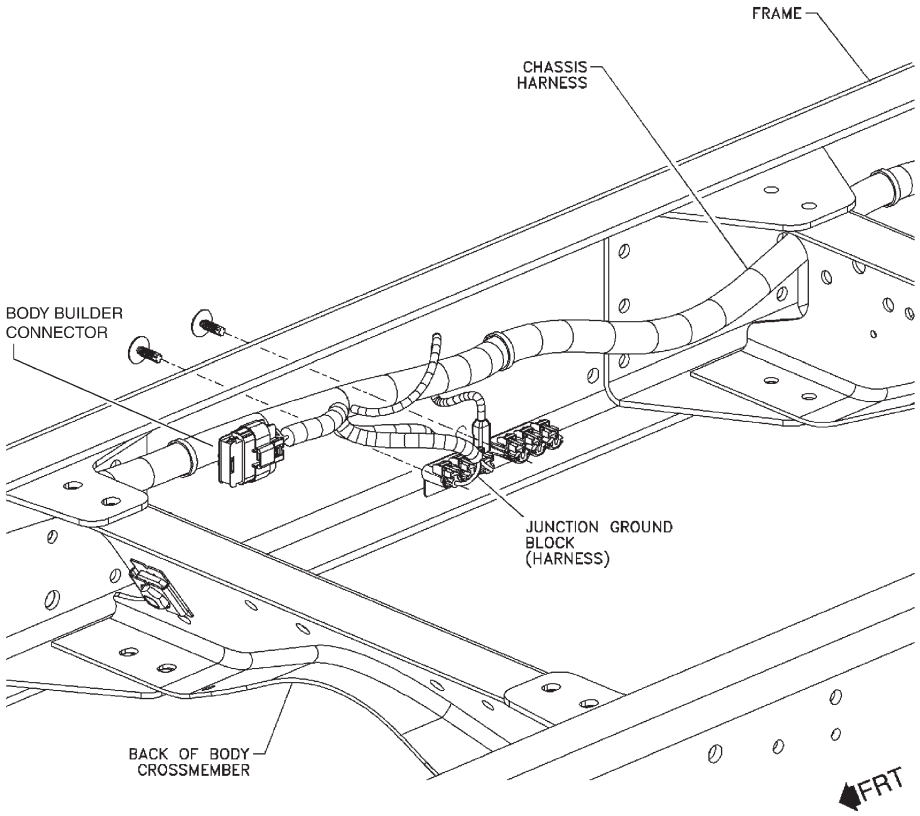


PPN = Production Part Number
SPN = Service Part Number

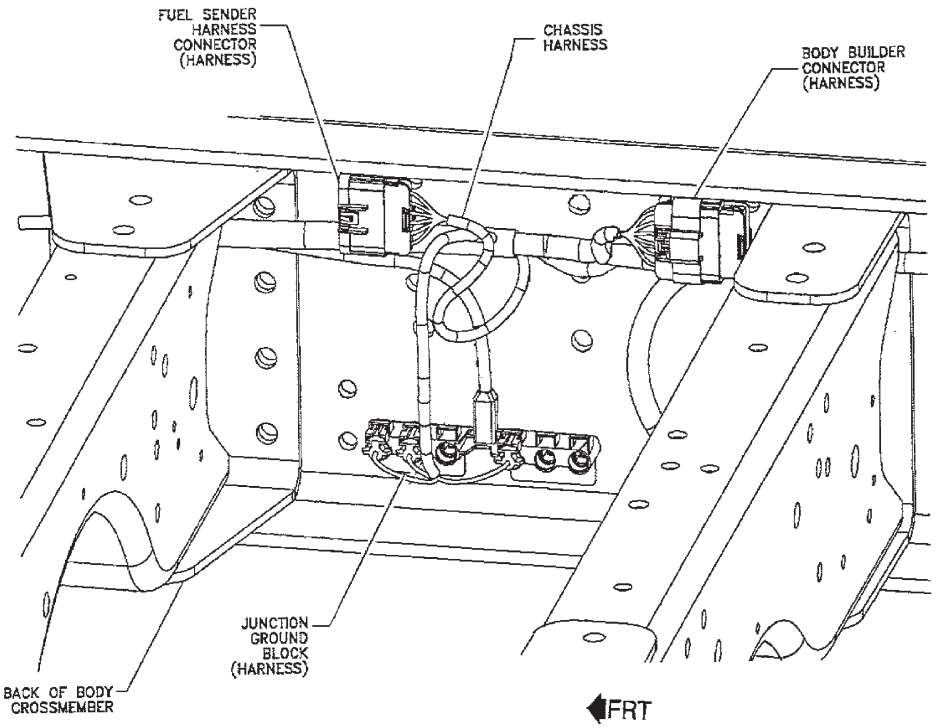
*4000 ppm (LF8 and LF6)

Body Builder Connector Location

Family 2



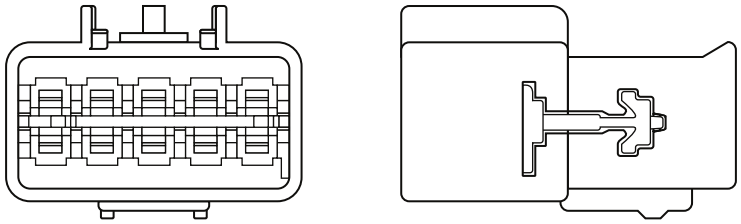
Family 3



10-Way Bus Connector (top) / 2-Way Bus Connector (bottom) – Family 2

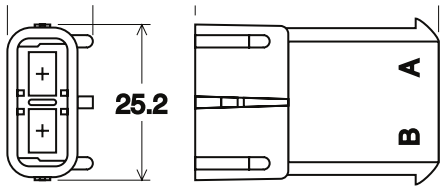
	TRUCK SIDE	BODY BUILDER SIDE
Connector	Packard GT 280 Series	
Typical connector	15326935 (M)	15326931 (F)
Typical terminal	15304722	15304710

Pin	Wire		Function
	Ckt #	Color	
A	24	GRN LT	Back Up
B	2609	BRN/WHT	Right Park
C	318	YEL	Left Turn
D	2509	BRN	Left Park
E	1320	BLU LT	Stop
F	—	—	Spare
G	—	—	Spare
H	350	BLK	Gnd Zone 3B
J	—	—	Spare
K	319	GRN DK	Right Turn

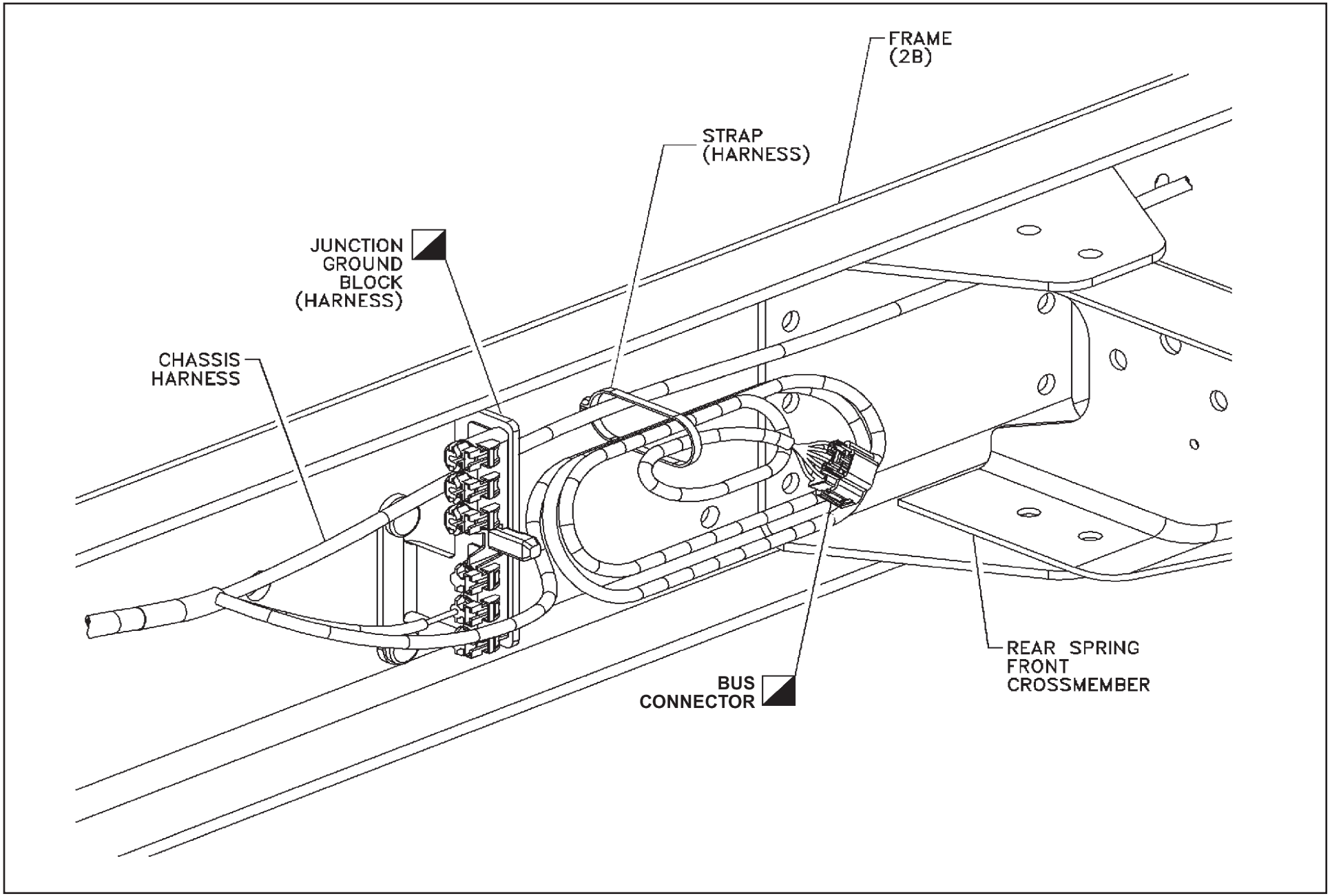


	TRUCK SIDE	BODY BUILDER SIDE
Connector	Packard MP 280 Series	
Typical connector	15300027 (F)	15300002
Typical terminal	12129493	12129497
Typical cable seal	15324980	15324980

Pin	Wire		Function
	Ckt #	Color	
A	24	GRN LT	Back Up
B	350	BLK	Gnd Zone B

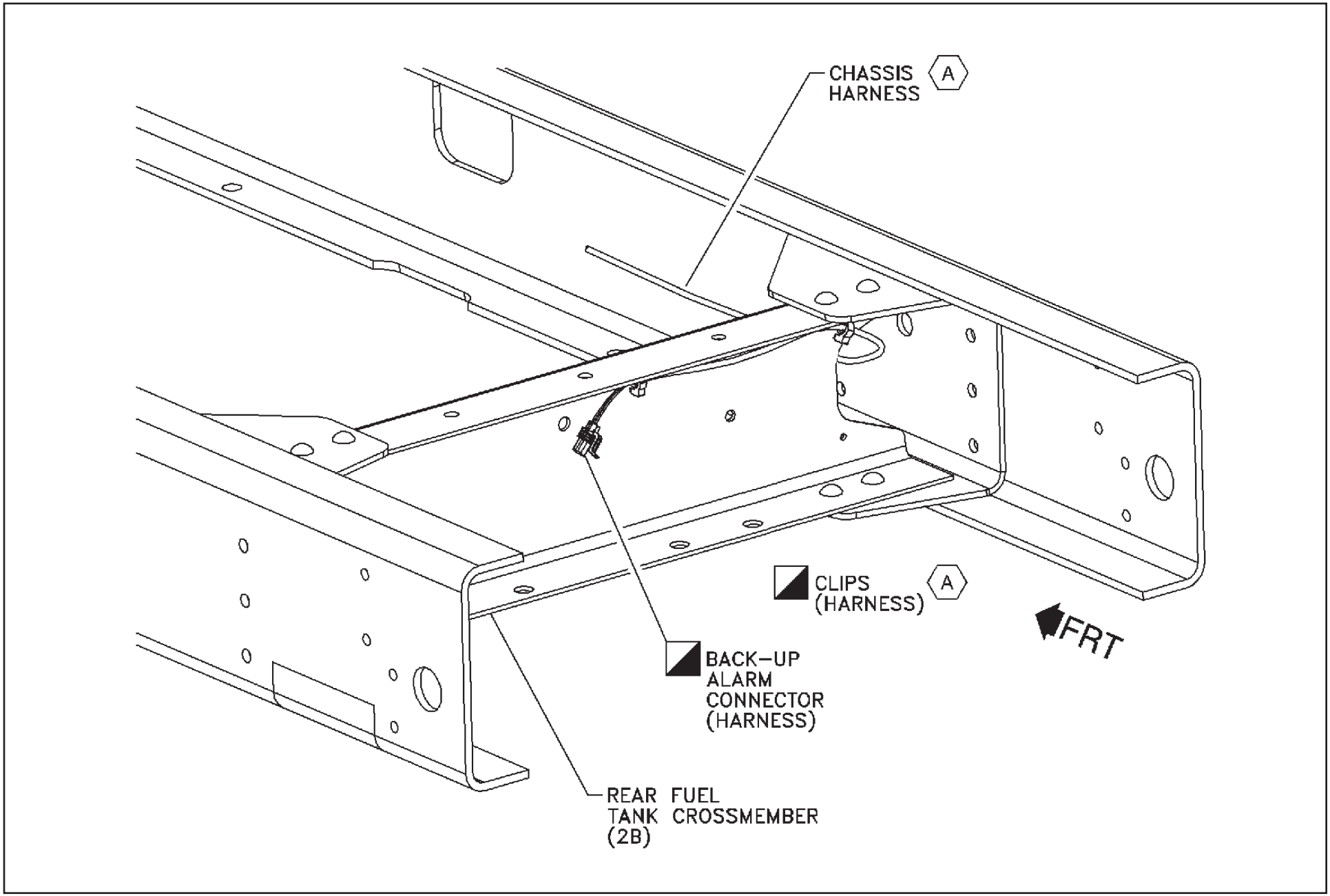


Bus Connector Location – Family 2



(continued on next page)

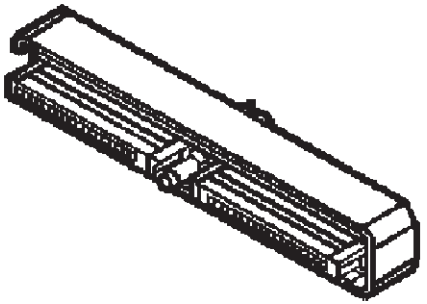
Bus Connector Location – Family 2 (continued)

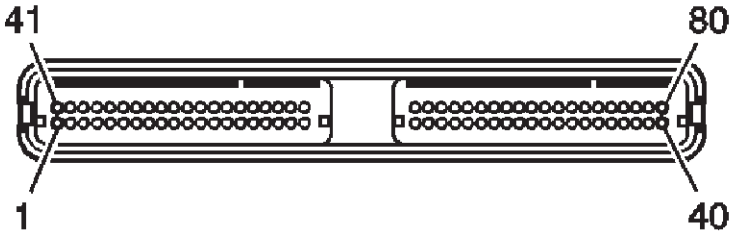


8.1L (L18) Powertrain Control Module (PCM) – Connector C-1

Connector	80-Way F Micro-Pack 100W Sealed (BU)
Typical Connector	12191489 (F)
Color	**BLU**
Typical Terminal	– – –
Typical Cable Seal	– – –

Pin	Wire Color	Circuit No.	Function
1	BK/WH	351	Ground
2	L-GN	1867	12-Volt Reference
3	PK/BK	1746	Fuel Injector 3 Control
4	L-GN/BK	1745	Fuel Injector 2 Control
5-6	—	—	Not Used
7	GY	705	5-Volt Reference
8-10	—	—	Not Used
11	L-BU	1876	Knock Sensor 2 Signal
12	D-BU/WH	1869	CKP Sensor Signal
13	OG/BK	463	Requested Torque Signal
14	OG/BK	1061	UART Serial Data (Secondary)
15	D-BU/WH	774	UART Serial Data (Tertiary)
16-18	—	—	Not Used
19	PK	439	Ignition 1 Voltage
20	OG	440	Battery Positive Voltage
21	YE/BK	1868	Low Reference
22	L-GN	488	PTO On Switch Signal
23	BK	470	Low Reference
24	BK/WH	251	Ground
25	—	—	Not Used
26	TN	1677	HO2S Low Signal - Bank 2 Sensor 1
27	BK/WH	251	Ground
28	—	—	Not Used
29	TN	1664	HO2S Low Signal - Bank 1 Sensor 1
30	L-GN	1478	Coolant Level Switch Signal
31	D-GN	534	High Idle Switch Signal





(continued on next page)

8.1L (L18) Powertrain Control Module (PCM) – Connector C-1 (continued)

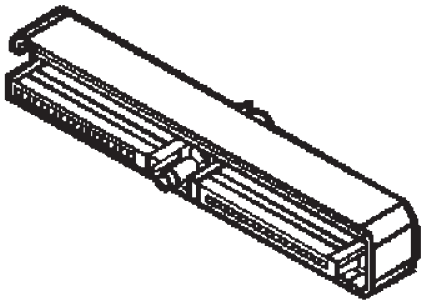
Pin	Wire Color	Circuit No.	Function
32	BK/WH	771	Transmission Range Switch Signal A (Allison® MD)
33	PU	420	TCC Brake Switch/Cruise Control Release Signal
34	WH	776	Transmission Range Switch Signal - Parity Bit (Allison® MD)
35	BN/WH	379	CPP Switch Signal (Manual Trans.)
36	BK	1744	Fuel Injector 1 Control
37	YE/BK	846	Fuel Injector 6 Control
38	—	—	Not Used
39	YE	447	Starter Relay Coil Control
40	BK/WH	351	Ground
41	PU	719	Low Reference (Manual Trans.)
42	—	—	Not Used
43	RD/BK	877	Fuel Injector 7 Control
44	L-BU/BK	844	Fuel Injector 4 Control
45-47	—	—	Not Used
48	GY	597	5-Volt Reference
49-50	—	—	Not Used
51	D-BU	496	Knock Sensor 1 Signal
52	YE	2522	PTO Engage Signal
53	—	—	Not Used
54	OG/BK	469	Low Reference
55-56	—	—	Not Used

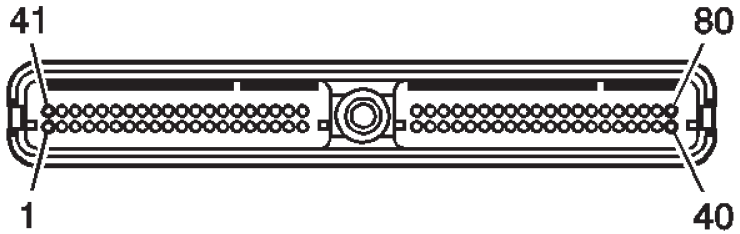
Pin	Wire Color	Circuit No.	Function
57	OG	440	Battery Positive Voltage
58	D-GN	1049	ECM/PCM/VCM Class 2 Serial Data
59-60	—	—	Not Used
61	PK/BK	632	Low Reference
62	—	—	Not Used
63	BK	407	Low Reference
64-65	—	—	Not Used
66	PU	1666	HO2S High Signal - Bank 2 Sensor 1
67-68	—	—	Not Used
69	PU/WH	1665	HO2S High Signal - Bank 1 Sensor 1
70	BN	1174	Oil Level Switch Signal
71	L-BU	494	Primary Brake Indicator Control
72	YE	772	Transmission Range Switch Signal B (Allison® MD)
73	BN/WH	633	CMP Sensor Signal
74	YE	410	ECT Sensor Signal
75	PK	1020	Off/Run/Crank Voltage
76	BK/WH	845	Fuel Injector 5 Control
77	D-BU/WH	878	Fuel Injector 8 Control
78	PU	2562	PTO Control
79	—	—	Not Used
80	GY	720	Low Reference

8.1L (L18) Powertrain Control Module (PCM) – Connector C-2

Connector	80-Way F Micro-Pack 100W Sealed (GN)
Typical Connector	12191488 (F)
Color	**GRN**
Typical Terminal	– – –
Typical Cable Seal	– – –

Pin	Wire Color	Circuit No.	Function
1	BK/WH	351	Ground
2	WH	2467	Crankshaft Sensor Supply Voltage (Allison® MD)
3	TN	1465	Fuel Pump Relay Control - Secondary
4	—	—	Not Used
5	TN/BK	464	Delivered Torque Signal (Allison® MD)
6-7	—	—	Not Used
8	—	—	Not Used
9	D-GN/WH	465	Fuel Pump Relay Control - Primary
10	WH	121	Engine Speed Signal
11-14	—	—	Not Used
15	BN	25	Charge Indicator Control
16	—	—	Not Used
17	D-GN/WH	762	A/C Request Signal
18	—	—	Not Used
19	GY/BK	1467	Air Shift Switch Signal (Allison® MD)
20	D-GN	2222	Signal Low - Rear
	—	—	Not Used
21	L-BU	2221	Signal High - Rear
22-23	—	—	Not Used
24	—	—	Not Used
25	TN	472	IAT Sensor Signal
26	PU	2121	IC 1 Control
27	RD	2127	IC 7 Control
28	L-BU/WH	2126	IC 6 Control
29	D-GN/WH	2124	IC 4 Control





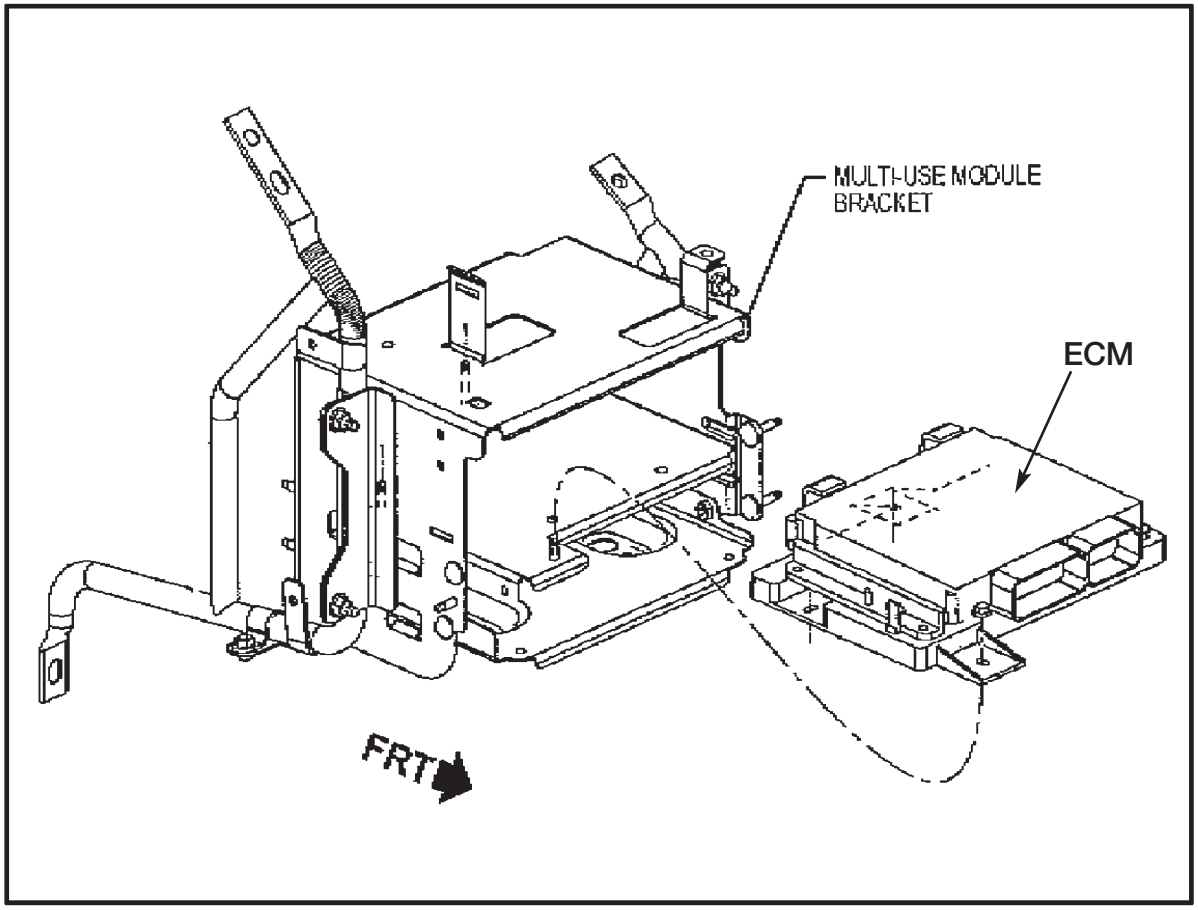
(continued on next page)

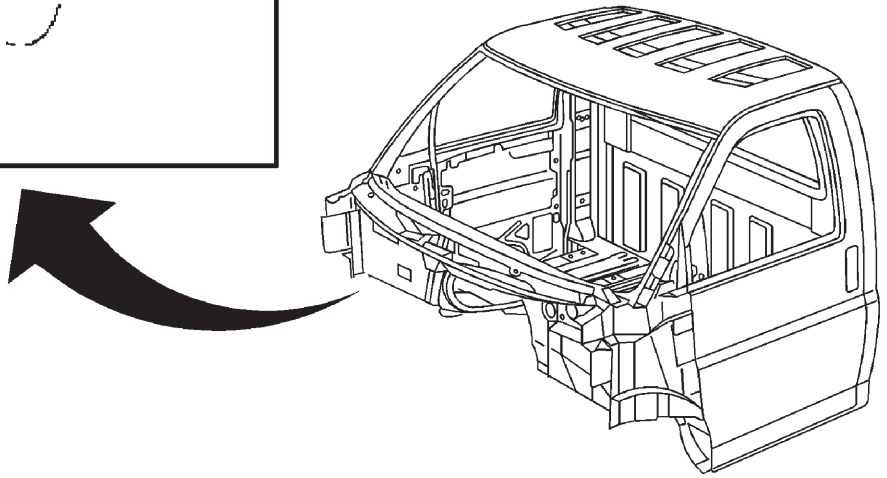
8.1L (L18) Powertrain Control Module (PCM) – Connector C-2 (continued)

Pin	Wire Color	Circuit No.	Function
30	—	—	Not Used
31	YE	492	MAF Sensor Signal
32	L-GN	432	MAP Sensor Signal
33	—	—	Not Used
34	D-GN/WH	428	EVAP Canister Purge Solenoid Control
35-38	—	—	Not Used
39	RD	631	12-Volt Reference
40	BK/WH	351	Ground
41-42	—	—	Not Used
43	D-GN/WH	459	A/C Compressor Clutch Relay Control
44	RD	2013	High Idle Indicator Control
45	—	—	Not Used
46	BN/WH	419	MIL Control
47-48	—	—	Not Used
49	YE/BK	1827	Vehicle Speed Signal
50	D-GN/WH	817	Vehicle Speed Signal
51-53	—	—	Not Used
54	PU	1589	Fuel Level Sensor Signal - Primary
55	D-GN	603	Low Coolant Indicator Control
56	—	—	Not Used

Pin	Wire Color	Circuit No.	Function
57	BK	552	Low Reference
58	TN/WH	332	Oil Pressure Sensor Signal
59	D-GN	1433	PNP/Clutch Start Switch Signal
60	BN	2129	Low Reference
61	BN/WH	2130	Low Reference
62	GY	773	Transmission Range Switch Signal C (Allison® MD)
63-65	—	—	Not Used
66	PU/WH	2128	IC 8 Control
67	RD/WH	2122	IC 2 Control
68	D-GN	2125	IC 5 Control
69	L-BU	2123	IC 3 Control
70-71	—	—	Not Used
72	BK/WH	3213	HO2S Heater High Control - Bank 2 Sensor 1
73	D-BU	1936	Fuel Level Sensor Signal - Secondary
74	L-GN	3212	HO2S Heater Low Control - Bank 2 Sensor 1
75	GY	23	Generator Field Duty Cycle Signal
76-80	—	—	Not Used

7.8L (LF8) Engine Control Module (ECM) – Location





7.8L (LF8) Engine Control Module (ECM) – Connector C-1

Connector Part Information

OEM: 1 928 404 781

Service: 19149311

Description: 96-Way F Bosch (BK)

Terminal Part Information

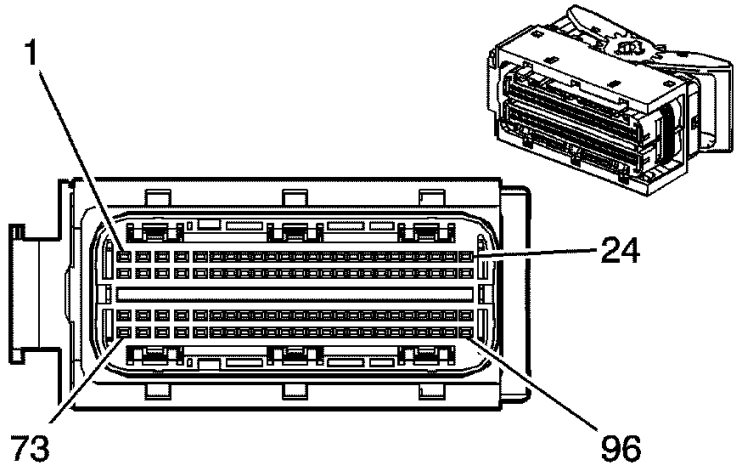
Terminal/Tray: 1928498135/19

Core/Insulation Crimp:
Pins: 1-3, 7-9, 12, 17-18, 20, 22-23, 26-28, 31-33, 37-41, 43, 45-48, 54-56, 62-64, 67-68, 70-71, 76-82, 93-96 : J/J

Core/Insulation Crimp: Pins: 4-5, 49-53, 74-75 : K/K

Release Tool/Test Probe: J-38125-213/J-35616-64B (L-BU)

Pin	Wire Color	Circuit No.	Function
1	BK/WH	351	Ground
2	BK/WH	351	Ground
3	BK/WH	351	Ground
4	BK/WH	351	Ground
5	BK/WH	351	Ground
6	--	--	Not used
7	BN	1271	Low Reference
8	PU	1272	Low Reference
9	GY	1273	Low Reference
10-11	--	--	Not Used
12	BK	470	Low Reference
13-16	--	--	Not Used
17	YE	2361	SAE J1939 Serial Data Bus+
18	D-GN	2362	SAE J1939 Serial Data Bus-
19	--	--	Not Used
20	D-GN	1049	ECM Class 2 Serial Data A



Pin	Wire Color	Circuit No.	Function
24-25	--	--	Not Used
26	BK/WH	351	Ground
27	BK/WH	351	Ground
28	WH	121	Engine Speed Signal
29-30	--	--	Not Used
31	D-Bu	1161	APP Sensor 1 Signal
32	L-BU	1162	APP Sensor 2 Signal
33	D-GN	1163	APP Sensor 3 Signal
9	GY	1273	Low Reference
34-36	--	--	Not Used
37	PU	1589	Fuel Level Signal - Primary
38	D-Bu	1936	Fuel Level Signal - Secondary
39	L-BU	2221	Signal High - Rear (Manual Transmission)
40	D-GN	2222	Signal Low - Rear (Manual Transmission)

(continued on next page)

7.8L (LF8) Engine Control Module (ECM) – Connector C-1 (continued)

Pin	Wire Color	Circuit No.	Function
41	GY	23	Generator Field Duty Cycle Signal
42	--	--	Not Used
43	GY/BK	1467	Shift Motor Relay - Control
44	--	--	Not Used
45	D-GN/WH	459	A/C Compressor Clutch Relay Control
46	GY	397	Cruise Control On Switch Signal
47	GY/BK	87	Cruise Control Resume/Accel Switch Signal
48	D-Bu	84	Cruise Control Set/Coast Switch Signal
49	BK/WH	1120	Ignition 1 Voltage
50	BK/WH	1120	Ignition 1 Voltage
51	OG	440	Battery Positive Voltage
52	L-BU	1121	ECM Power Enable Signal
53	L-BU	1121	ECM Power Enable Signal
54	WH/BK	1164	5-Volt Reference
55	TN	1274	Oil Level Switch Signal
56	YE/BK	1275	5-Volt Reference
57-61	--	--	Not Used
62	L-BU	1320	Stop Lamp Switch Signal
63	PU	420	TCC Brake Switch/Cruise Control Release Signal
64	BN/WH	379	CPP Switch Signal (Manual Transmission)
65-66	--	--	Not Used
67	L-GN	2081	Exhaust Brake Request Signal (K40/NPE)

Pin	Wire Color	Circuit No.	Function
69	--	--	Not Used
70	L-GN	1478	Coolant Level Switch Signal
71	L-GN	24	Backup Lamp Supply Voltage
72-73	--	--	Not Used
74	YE	505	Glow Plug Relay Control
75	PU	2562	PTO Control
76	YE	447	Starter Relay Coil Control
77	PU	2656	Exhaust Brake Relay Control (K40)
78	RD	2013	High Idle Indicator Control
79	D-BU	507	Wait to Start Indicator Control
80	BN/WH	419	MIL Control
81	D-GN/WH	817	Vehicle Speed Signal
82	YE/BK	1827	Vehicle Speed Signal
83-92	--	--	Not Used
93	L-GN	488	PTO On Switch-Signal
94	L-BU	494	PTO Engine Kill Switch
95	YE	2522	PTO Engage Signal
96	D-GN	1433	PNP/Clutch Start Switch Signal

7.8L (LF8) Engine Control Module (ECM) – Connector C-2

Connector Part Information

OEM: 1 928 404 752

Service: See Catalog

Description: 58-Way F Bosch (BK)

Terminal Part Information

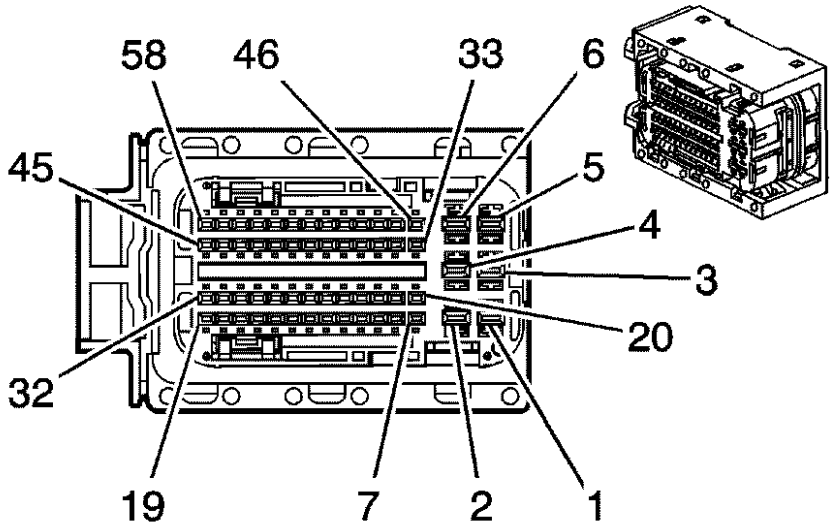
Terminal/Tray: See Terminal Repair Kit

Core/Insulation Crimp: See Terminal Repair Kit

Core/Insulation Crimp: Pins: 4-5, 49-53, 74-75 : K/K

Release Tool/Test Probe: See Terminal Repair Kit

Pin	Wire Color	Circuit No.	Function
1	BK	B1	Turbocharger Vane Position Control Solenoid Valve High Control
2	--	--	Not Used
3	WH	B3	Injector Positive Voltage Control 1
4	RD	B4	Injector Positive Voltage Control 2
5	WH	B5	Injector Positive Voltage Control 1
6	RD	B6	Injector Positive Voltage Control 2
7	BK/WH	B7	EGR Motor U Supply Voltage
8	D-GN	B8	EGR Motor V Supply Voltage
9	RD/YE	B9	EGR Motor W Supply Voltage
10-11	--	--	Not Used
12	BK	B12A	Low Reference
13	BK	B13A	Low Reference
14	BK/YE	B14	Low Reference
15	GY	B15A	Low Reference
16	BK	B16A	Low Reference
17	WH/BK	B17	Ground
18	BK	B18A	Drain Wire
19	GY	B19	Drain Wire



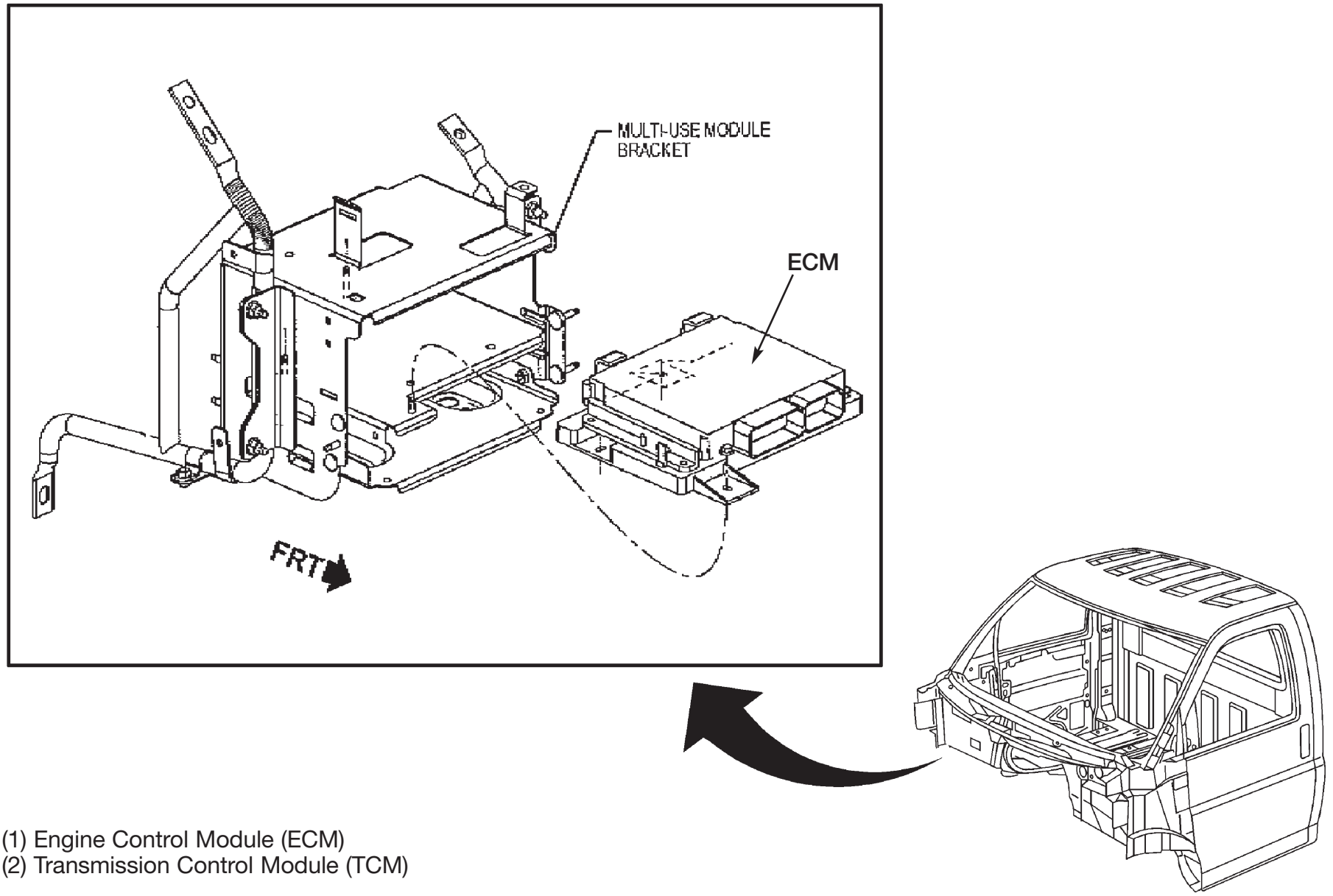
(continued on next page)

7.8L (LF8) Engine Control Module (ECM) – Connector C-2 (continued)

Pin	Wire Color	Circuit No.	Function
22-23	--	--	Not Used
24	WH	B24	MAP Sensor Signal
25	WH	B25A	Fuel Pressure Sensor Signal
26	WH	B26	Fuel Pressure Sensor Signal
27	GY	B27	Oil Pressure Sensor Signal
28	WH	B28	MAF Sensor Signal
29	WH	B29	Turbocharger Vane Position Signal
30	WH	B30	CMP Sensor Low
31	WH	B31	CKP Sensor High
32	BK	B32	CKP Sensor Low
33	WH	B33	SCV High Signal
34	WH	B34	SCV High Signal
35	D-BU/WH	B35	ECT Sensor Signal
36	--	--	Not Used
37	D-GN/WH	B37	IAT Sensor Signal
38	D-BU/RD	B38	EGR Motor Position U Signal
39	WH/RD	B39	EGR Motor Position V Signal

Pin	Wire Color	Circuit No.	Function
40	YE/RD	B40	EGR Motor Position W Signal
41	YE	B41	Fuel Temperature Sensor Signal
42	RD	B42	Low Reference
43	RD	B43	Fuel Injector 6 Control
44	BK	B44	Fuel Injector 4 Control
45	BK/RD	B45	Fuel Injector 5 Control
46	RD	B46	5-Volt Reference
47	RD	B47	5-Volt Reference
48	WH	B48	5-Volt Reference
49	WH	B49	5-Volt Reference
50	RD	B50	5-Volt Reference
51	RD	B51	5-Volt Reference
52	D-GN	B52	Oil level Switch Signal
53-55	--	--	Not Used
56	WH	B56	Fuel injector 3 Control
57	D-BU	B57	Fuel injector 2 Control
58	YE	B58	Fuel injector 1 Control

6.6L (LMM) Engine Control Module (ECM) Location



(1) Engine Control Module (ECM)
(2) Transmission Control Module (TCM)

6.6L (LMM) Engine Control Module (ECM) – Connector C-1

Connector Part Information

OEM: 15438366

Service: 19149311

Description: 96-Way F Mixed Series, Sealed (BK)

Terminal Part Information

Pins: 1-3, 25-27, 48-51, 73-77, 96

Terminal/Tray: 1928498135/19

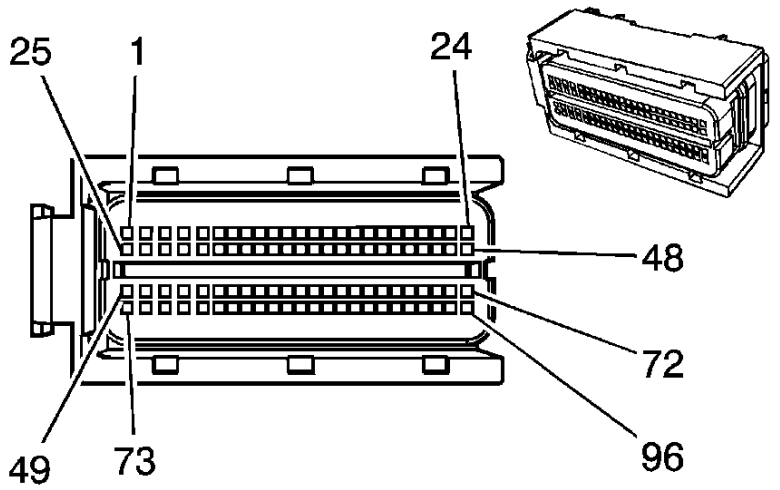
Core/Insulation Crimp: K/K

Release Tool/Test Probe: J-38125-213/J-35616-64B (L-BU)

Pins: 4-15, 17, 19-21, 23-24, 28, 30-31, 33-45, 47, 56-67-70, 72, 78-80, 84-86, 88, 91-94

Core/Insulation Crimp: J/J

Pin	Wire Color	Circuit No.	Function
1	OG	5421	Injector Postive Voltage Control Group 1
2	D-BU/WH	878	Fuel Injector 8 Control
3	RD/BK	877	Fuel Injector 7 Control
4	D-BU	2364	Cooling Fan Speed Signal
5	YE	492	MAF Sensor Signal
6	OG/BK	469	Low Reference
7	PU	806	Crank Voltage
8	YE	2522	PTO Engage Signal
9	BN	1174	Oil Level Switch Signal
10	GY/BK	87	Cruise Control Resume/Accel Switch Signal
11	Y/BK	6272	Low Reference
12	GY	2704	5-Volt Reference 3
13	TN	5928	5-Volt Reference 3
14	BN/WH	6136	5-Volt Reference 2



Pin	Wire Color	Circuit No.	Function
18	--	--	Not Used
19	L-GN	432	MAP Sensor Signal
20	YE	5947	Turbocharger Vane Position Sensor Signal
21	L-BU	1162	APP Sensor 2 Signal
22	--	--	Not Used
23	BK	2755	Low Reference
24	PU/WH	2530	Fuel Pressure Regulator Solenoid Supply Voltage
25	PK	5425	Injector Positive Voltage Control Group 4
26	YE/BK	846	Fuel Injector 6 Control
27	PK/BK	1746	Fuel Injector 3 Control
28	WH/BK	2366	Cooling Fan Clutch Control

(continued on next page)

6.6L (LMM) Engine Control Module (ECM) – Connector C-1 (continued)

Pin	Wire Color	Circuit No.	Function
29	--	--	Not Used
30	OG/BK	2919	Low Reference
31	L-BU	494	PTO Engine Kill Signal
32	--	--	Not Used
33	BK	476	Low Reference
34	D-BU	84	Cruise Control Set/Coast Switch Signal
35	YE/BK	6055	Low Reference
36	BK	2752	Low Reference
37	GY	2702	5-Volt Reference 3
38	TN	1274	5-Volt Reference 2
39	TN	2917	5-Volt Reference 2
40	PU/WH	6270	5-Volt Reference 1
41	D-BU	6259	5-Volt Reference 1
42	TN	472	IAT Sensor 1 Signal
43	D-BU/WH	6053	Exhaust Pressure Sensor Signal (1)
44	TN/WH	331	Oil Pressure Sensor Signal
45	L-GN	2032	Coolant Temperature Sensor Signal
46	--	--	Not Used
47	BK	2761	Low Reference
48	D-BU	5930	Turbocharger Vane Position Control Solenoid Valve Control
49	PU	5423	Injector Positive Voltage Control Group 3
50	BK/WH	845	Fuel injector 5 Control
51	L-BU	844	Fuel injector 4 Control
52	--	--	Not Used
53	YE/BK	6120	Low Reference

Pin	Wire Color	Circuit No.	Function
54-55	--	--	Not Used
56	D-BU/WH	6265	CMP Sensor Signal
57	GY/BK	1694	4WD Low Signal
58	L-GN	1478	Coolant Level Switch Signal
59	D-GN	534	High Idle Switch Signal
60	L-GN	488	PTO On Switch Signal
61	GY	397	Cruise Control On Switch Signal
62	BK	552	Low Reference
63	OG/BK	5929	Low Reference
64	GY	596	5-Volt Reference
65	L-BU	6118	IAT Sensor 2 Signal
66	--	--	Not Used
67	BN/WH	5763	EGR Valve Position Signal
68	YE	410	ECT Sensor Signal
69	D-BU	5277	Exhaust Gas Temperature Sensor (1)
70	BN	6782	Exhaust Gas Temperature Sensor (1) Low Reference
71	--	--	No Used
72	YE	2834	Fuel Pressure Regulator Solenoid Control
73	YE	5422	Injector Positive Voltage Control Group 2
74	BK	1744	Fuel Injector 1 Control
75	L-GN/BK	1745	Fuel injector 2 Control
76	PK	339	Ignition 1 Voltage
77	OG	440	Battery Positive Voltage
78	PU	1272	Low Reference
79	WH/BK	6271	CKP Sensor Signal

(continued on next page)

6.6L (LMM) Engine Control Module (ECM) – Connector C-1 (continued)

Pin	Wire Color	Circuit No.	Function
80	D-GN/WH	2523	A/C Request Signal
81-83	--	--	Not Used
84	L-GN	24	Backup Lamp Supply Voltage
85	YE/BK	508	Water In Fuel Indicator Control
86	BK	2753	Low Reference
87	--	--	Not Used
88	BN	6266	Low Reference
89-90	--	--	Not Used
91	D-Gn	485	TP Sensor 1 Signal
92	YE	2918	FRP Sensor Signal
93	L-BU	5377	Exhaust Gas Temperature Sensor 2
94	BN/WH	6783	Low Reference
95	--	--	Not Used
96	WH	5931	Low Reference

6.6L (LMM) Engine Control Module (ECM) – Connector C-2

Connector Part Information

OEM: 15462694

Service: 88988935

Description: 58-Way F Mixed Series, Sealed (BK)

Terminal Part Information

Pins: 1-6

Terminal/Tray: 1928498059/24

Core/Insulation Crimp: 2/5

Release Tool/Test Probe: J-38125-561/J-35616-35 (VT)

Pins: 33, 46

Terminal/Tray: 1928498135/19

Core/Insulation Crimp: K/K

Release Tool/Test Probe: J-38125-213/J-35616-64B (L-BU)

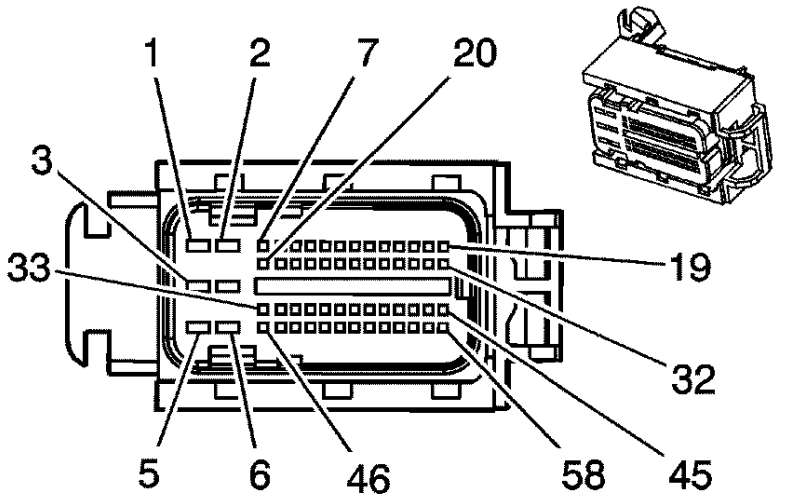
Pins: 7, 9, 11-12, 15-26, 28-32, 33, 36, 38-40, 41, 44-45, 47-50, 53-57

Terminal/Tray: 1928498135/19

Core/Insulation Crimp: J/J

Release Tool/Test Probe: J-38125-213/J-35616-64B (L-BU)

Pin	Wire Color	Circuit No.	Function
1	PK	339	Ignition 1 Voltage
2	BK/WH	351	Ground
3	PK	339	Ignition 1 Voltage
4	BK/WH	351	Ground
5	PK	339	Ignition 1 Voltage
6	BK/WH	351	Ground
BN	BN	582	TAC Motor Control -2
8	--	--	Not Used
9	D-GN	1049	ECM Class 2 Serial Data
10	--	--	Not Used



Pin	Wire Color	Circuit No.	Function
15	WH/BK	1164	5-Volt Reference 3
16	D-BU	507	Wait To Start Indicator Control
17	RD	2013	High Idle Indicator Control
18	PU	2562	PTO Control
19	GY	2219	IGN B Relay Control
20	YE	581	TAC Motor Control - 1
21	PK	439	Ignition 1 Voltage
22	L-BU	1320	Stop Lamp Supply Voltage
23	BN	25	Charge Indicator Control
24	BN	2524	Generator 2 Turn On Signal (K65)
25	D-GN	603	A/C Low Pressure Switch Signal
26	BN/WH	6141	Low Reference

(continued on next page)

6.6L (LMM) Engine Control Module (ECM) – Connector C-2 (continued)

Pin	Wire Color	Circuit No.	Function
27	--	--	Not Used
28	GY	2365	5-Volt Reference 1
29	BN	1271	Low Reference
30	BN/WH	419	MIL Control
31	D-GN/WH	459	A/C Compressor Clutch Relay Control
32	YE	447	Starter Relay Coil Control
33	OG/BK	5764	EGR Motor High Control
34	BK	470	Low Reference
35	--	--	Not Used
36	PU	1589	Fuel Level Sensor Signal - Primary
37	--	--	Not Used
38	GY	23	Generator Field Duty Cycle Signal
39	OG/BK	1786	Park/Neutral Signal (Automatic Transmission)
40	PU	420	TCC Brake Switch/Cruise Control Release Signal
41	--	--	Not Used
42	D-GN/WH	817	Vehicle Speed Signal

Pin	Wire Color	Circuit No.	Function
43	--	--	Not Used
44	TN	6106	High Speed GMLAN Serial Data Bus-
45	L-BU/BK	2221	Signal High - Rear
46	L-GN/BK	5746	EGR Motor Low Control
47	BN	6062	Low Reference
48	YE	1578	Fuel Temperature Signal
49	D-BU	1161	APP Sensor 1 Signal
50	D-BU	1936	Fuel Level Sensor Signal - Secondary
51-52	--	--	Not Used
53	L-GN	2081	Engine Exhaust Brake Switch Control
54	YE/BK	1827	Vehicle Speed Signal
55	WH	121	Engine Speed Signal
56	PK	1020	Ignition 0 Voltage
57	TN/WH	6105	High Speed GMLAN Serial Data Bus+
58	--	--	Not Used

Engine Control Module (ECM) – (LF6) C-1

Connector Part Information

OEM: 12 186 584

Service: 12 186 584

Description: 70-Way F, Sealed (BK)

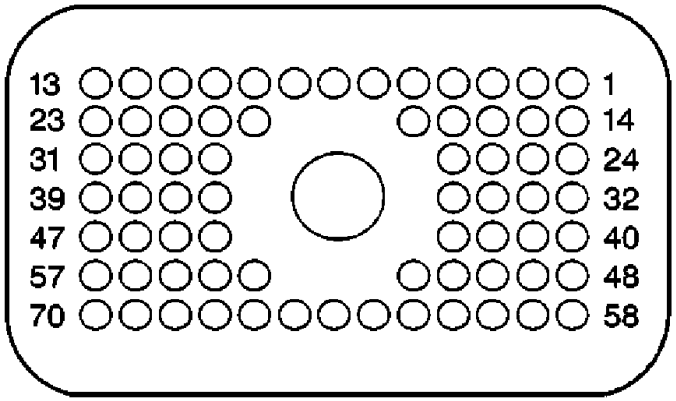
Terminal Part Information

Terminal/Tray: See Terminal Repair Kit

Core/Insulation Crimp: See Terminal Repair Kit

Release Tool/Test Probe: See Terminal Repair Kit

Pin	Wire Color	Circuit No.	Function
1-2	--	--	Not Used
3	0.8 BK	470	Low Reference
4	0.8 WH/BK	1164	5-Volt Reference
5	0.8 BK/WH	451	Ground
6	0.8 GY/BK	1467	Shift Motor Relay - Control (HPZ)
7	0.8 L-BU	494	Engine Shut-Off Signal
8	0.8 TN/BK	1921	SAE J1708 Serial Data A
9	Wh/BK	1922	SAE J1708 Serial Data B
10	--	--	Not Used
11	0.8 RD	2013	High Idle Indicator Control
12	BK/WH	1962	Engine Brake Solenoid Feed
13-14	--	--	Not Used
15	0.8 PU	1589	Fuel Level Sensor Signal-Primary
16-18	--	--	Not Used
19	0.8 D-GN/WH	2665	PTO Enable
20-21	--	--	Not Used
22	0.8 BN/WH	379	CPP Switch Signal (Manual Transmission)
23	0.8 L-GN	2081	Exhaust Brake Switch Signal
24-26	--	--	Not Used



Pin	Wire Color	Circuit No.	Function
27	0.8 D-BU	1936	Fuel Level Sensor Signal (Secondary)
28	0.8 BN/WH	419	MIL Control
29	--	--	Not Used
30	0.8 BK	750	PTO Lamp Status
31	0.8 YE	447	Starter Relay Coil Control
32	0.8 L-BU	2221	Signal High-Rear (Manual Transmission)
33	0.8 D-GN	2222	Signal Low-Rear (Manual Transmission)
34	0.8 D-GN	2362	SAE J1939 Serial Data Bus -
35	0.8 D-BU	84	Cruise Control Set/Coast Switch Signal
36	0.8 D-GN/WH	817	Vehicle Speed Signal
37	--	--	Not Used

(continued on next page)

Engine Control Module (ECM) – (LF6) C-1 (continued)

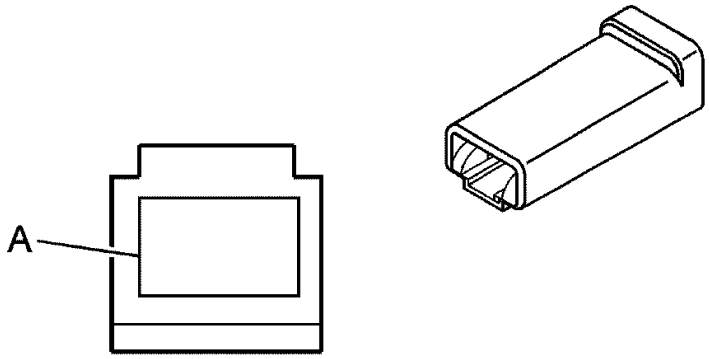
Pin	Wire Color	Circuit No.	Function
38	0.8 WH	121	Engine Speed Signal
39	--	--	Not Used
40	0.8 L-GN	2081	Exhaust Brake Switch Signal
40	0.8 L-GN	2081	Exhaust Brake Switch Signal
41-43	--	--	Not Used
44	0.8 GN/BK	87	Cruise Control Resume/Accel Switch Signal
45	0.8 BN	86	Cruise Control Release Signal
46	0.8 D-GN	534	High Idle Switch Signal
47	--	--	Not Used
48	2.0 OG	1540	Battery Positive Voltage
49	L-GN	1478	Coolant Level Switch Signal
50	0.8 YE	2361	SAE J1939 Serial Data Bus+
51	--	--	Not Used
52	2.0 OG	1540	Battery Positive Voltage
53	2.0 OG	1540	Battery Positive Voltage

Pin	Wire Color	Circuit No.	Function
54	--	--	Not Used
55	2.0 OG	1540	Battery Positive Voltage
56	0.8 L-GN	488	PTO On Switch - Signal
57	--	--	Not Used
58	0.8 PU	2663	PTO Set
59	0.8 GY	397	Cruise Control On Switch Signal
60	0.8 TN	2664	Coolant Fan Control
61	--	--	Not Used
62	1.0 D-GN.WH	459	A/C Compressor Clutch Relay Control
63	2.0 BK/WH	251	Ground
64	0.8 L-BU	1320	Stop Lamp Supply Voltage
65	2.0 BK/WH	251	Ground
66	0.8 D-BU	1161	APP Sensor 1 Signal
68	--	--	Not Used
69	2.0 BK/WH	251	Ground
70	0.8 PK	439	Ignition 1 Voltage

Engine Control Module (ECM) – (LF6) C-2

Connector Part Information
OEM: 2645732
Service: --
Description: 120-Way F, Sealed (Caterpillar)
Terminal Part Information
Terminal/Tray: See Terminal Repair Kit
Core/Insulation Crimp: See Terminal Repair Kit
Release Tool/Test Probe: See Terminal Repair Kit

Pin	Wire Color	Circuit No.	Function
1-4	--	--	Not Used
5	0.8 OG	F793	Intake Air (IA) Heater Relay Power
6-9	--	--	Not Used
10	0.8 OG	C801	ARD Air Control Valve Signal
11-14	--	--	Not Used
15	0.8 PK	R746	Intake Manifold Air Pressure Sensor Signal
16	0.8 WH	U780	Manifold Absolute Pressure (MAP) Sensor Signal
17	0.8 GN	G829	Low Reference
18-19	--	--	Not Used
20	0.8 GY	C800	ARD Air Control Valve Return
21-23	--	--	Not Used
24	0.8 WH	X980	Turbo Speed -
25	0.8 BK	E963	Camshaft Low Reference Top CAM -
26	0.8 WH	G856	Engine Timing Calibration Probe+
27	--	--	Not Used
28	0.8 GY	994	Oil Pressure Sensor Signal
29	--	--	Not Used
30	0.8 PK	G833	Low Reference



Pin	Wire Color	Circuit No.	Function
31	--	--	Not Used
32	0.8 BN	C815	VNT Actuator Return
33	--	--	Not Used
34	0.8 YE	X981	Turbo Speed +
35	0.8 WH	E964	Camshaft Sensor Signal Top CAM+
36	0.8 YE	G857	Engine Timing Calibration Probe -
37	--	--	Not Used
38	0.8 GN	C829	Ambient Air Temperature Sensor Signal
39-40	--	--	Not Used
41	0.8 BN	C803	ARD Fuel Pilot Pressure Sensor Signal
42	--	--	Not Used

(continued on next page)

Engine Control Module (ECM) – (LF6) C-2 (continued)

Pin	Wire Color	Circuit No.	Function
43	0.8 GY	U775	CGI Actuator Return
44	0.8 GN	C814	VNT Actuator Signal
45	0.8 PK	Y735	Purge Air Control Signal
46	0.8 YE	E966	Camshaft Sensor Signal Bottom CAM+
47	0.8 BU	E965	Low Reference Bottom CAM -
48-50	--	--	Not Used
51	0.8 BU	U774	CGI Actuator Signal
52	0.8 GY	Y738	Low Reference
53	--	--	Not Used
54	0.8 BU	G827	Low Reference
55	0.8 PK	T846	ARD Turbo Outlet Temperature Sensor Signal
56	0.8 YE	Y741	Particulate Trap Intake (PTI) Air Temperature #1
57	0.8 BN	U779	Barometric Pressure Signal
58	--	--	Not Used
59	0.8 PU	Y733	ARD Fuel Main Pressure Control Valve
60	0.8 BU	Y734	Low Reference
61	0.8 OG	C820	Fuel Pump 2 Driver (AFT)
62	--	--	Not Used
63	0.8 OG	Y753	ARD Flame Boundary Temperature Sensor Signal
64-65	--	--	Not Used
66	1.0 PK	Y746	Particulate Trap Differential (PTD) Pressure #1
67-68	--	--	Not Used
69	0.8 YE	Y737	ARD Fuel Enable Valve

Pin	Wire Color	Circuit No.	Function
70	0.8 PU	U773	Mass Air Flow (MAF) Temperature Sensor Signal
71	--	--	Not Used
72	0.8 WH	G828	5-Volt Reference
73-75	--	--	Not Used
76	0.8 BU	C830	Inlet Air Heater Relay Return
77	0.8 BU	C818	Fuel Pump 1 Driver (FORE)
78	--	--	Not Used
79	0.8 YE	H807	Purge Air Solenoid Return
80	0.8 BN	G826	5-Volt Reference
81	0.8 WH	Y748	5-Volt Reference
82	1.0 YE	U781	5-Volt Reference
83	0.8 GN	Y749	Low Reference
84	0.8 BU	995	Coolant Temperature Sensor Signal
85	0.8 BN	G849	Fuel Rail Pressure Sensor Signal
86-87	--	--	Not Used
88	0.8 OG	Y751	ARD Ignition Coil Return
89	1.0 BN	Y747	ARD Fuel Main Pressure Signal
90	--	--	Not Used
91	0.8 OG	Y743	ARD Outlet Temperature Sensor Signal
92	--	--	Not Used
93	1.0 PK	U782	Low Reference
94	1.0 GN	Y742	Particulate Trap Outlet (PTO) Air Temperature #1
95	0.8 BU	C967	Intake MAT Sensor Signal
96-98	--	--	Not Used
99	1.0 OG	T860	Injector 5 & 6 Return

(continued on next page)

Engine Control Module (ECM) – (LF6) C-2 (continued)

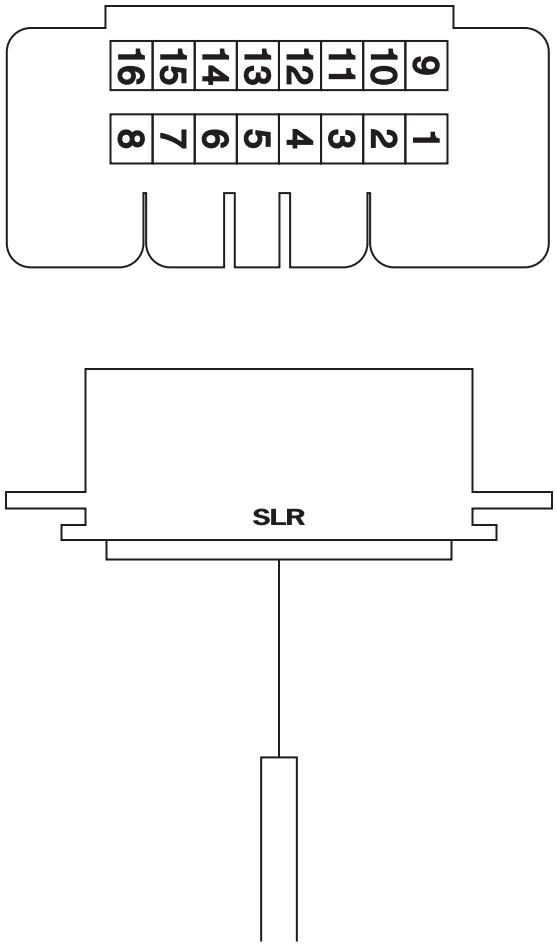
Pin	Wire Color	Circuit No.	Function
100-103	--	--	Not Used
104	1.0 GY	T858	Injector 1 & 2 Return
105	1.0 WH	T962	Fuel Injector 6 Control
106	1.0 BN	T959	Fuel Injector 3 Control
107	1.0 GN	T961	Fuel Injector 5 Control
108	1.0 BU	T960	Fuel Injector 4 Control
109	1.0 YE	Y750	ARD Ignition Coil
110	--	--	Not Used

Pin	Wire Color	Circuit No.	Function
111	0.8 PU	C819	Fuel Pump 1 Return
112	--	--	Not Used
113	0.8 BN	C821	Fuel Pump 2 Return
114	--	--	Not Used
115	1.0 WH	T859	Injector 3 & 4 Return
116	1.0 PU	T957	Fuel Injector 1 Control
117	--	--	Not Used
118	1.0 YE	T958	Fuel Injector 2 Control
119-120	--	--	Not Used

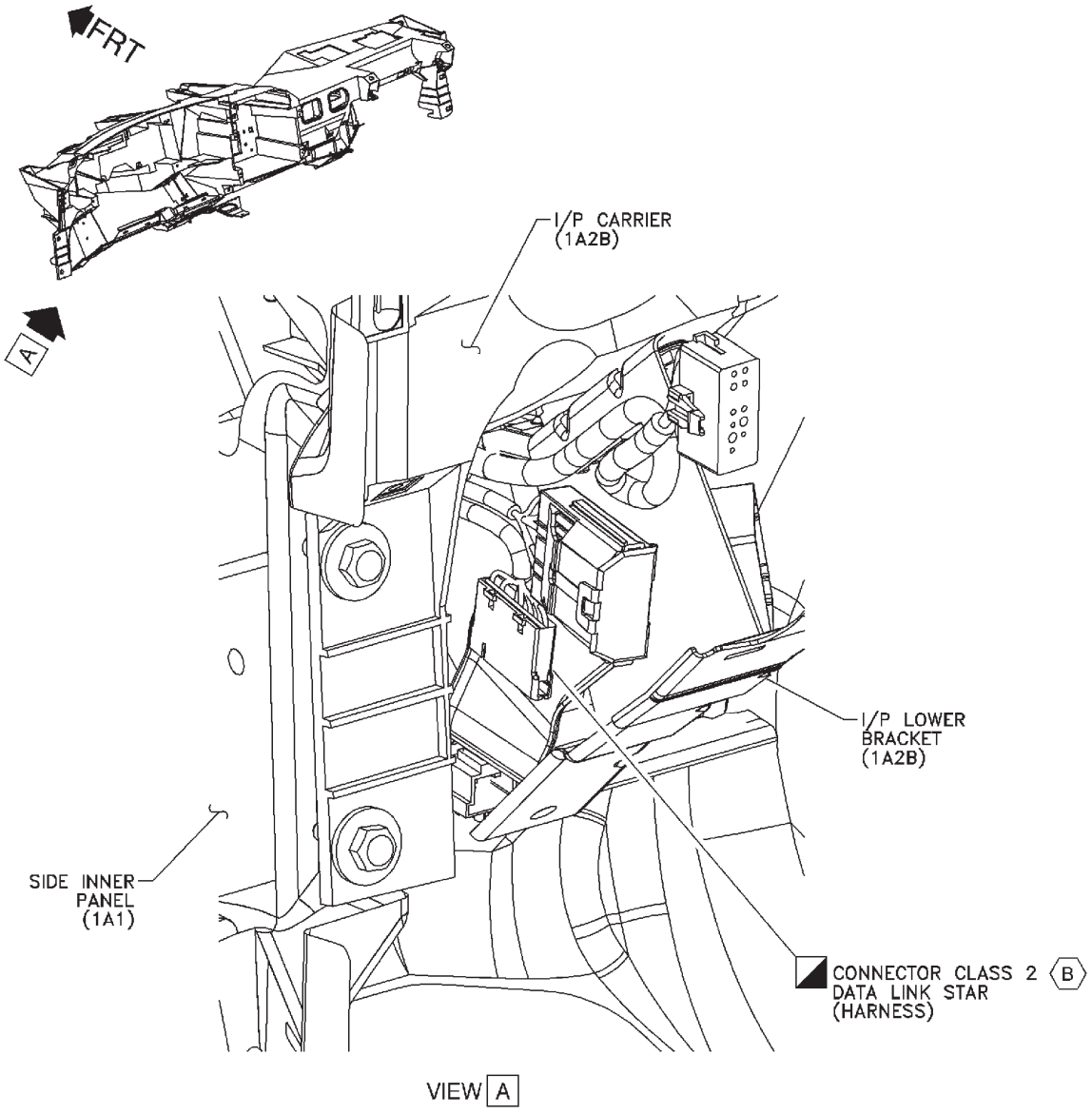
16-Way Serial Data Link Connector

Connector	Packard 150 MP Series
Typical connector	12110256
Typical terminal	12040993

Pin	Wire		Function
	Ckt #	Color	
1	—	—	Spare
2	1132	PPL	Right Park
3	—	—	Left Turn
4	750	BLK	Left Park
5	1451	BLK/WHT	Stop
6	—	—	Spare
7	1921	TAN/BLK	Spare
8	1455	BLK/WHT	Gnd Zone 3B
9	—	—	Spare
10	—	—	Spare
11	—	—	Spare
12	—	—	Spare
13	—	—	Spare
14	—	—	Spare
15	1922	WHT/BLK	DTC J1708 / J1587(-)
16	840	ORN	DLC Power



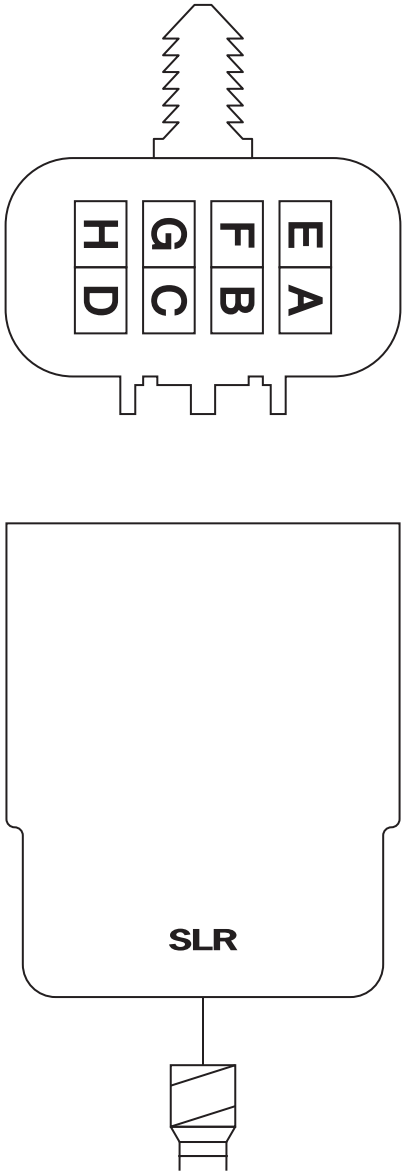
Serial Data Link Connector Location



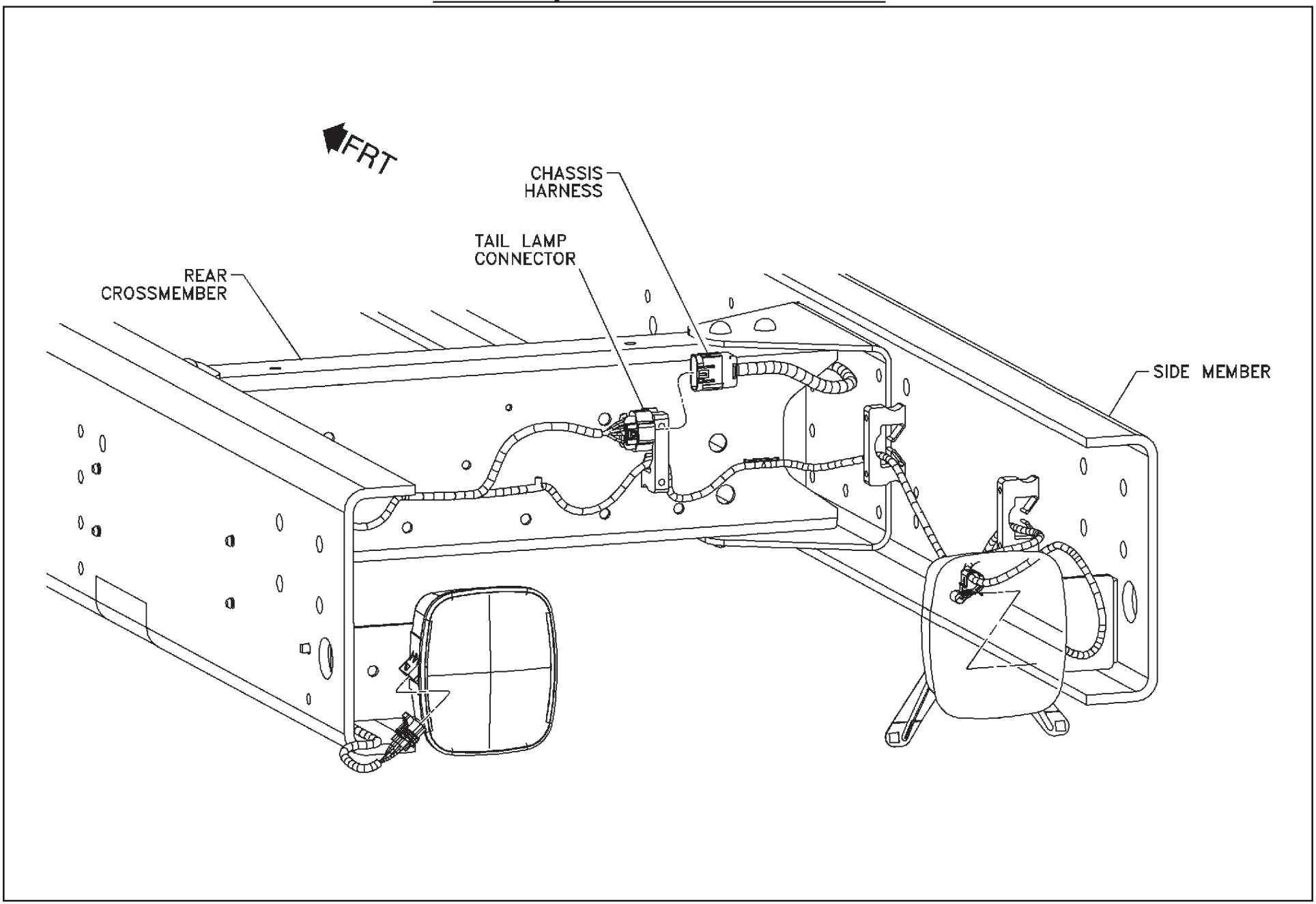
8-Way Tail Lamp Connector

	TRUCK SIDE	BODY BUILDER SIDE
Connector	Packard 280 Series	
Typical connector	15326906 (F)	15326655 (M)
Typical terminal	15304718	15304730
Typical cable seal	12191232	12191232

Pin	Wire		Function
	Ckt #	Color	
A	618	YEL	LR Stop/Turn
B	2609	BRN	Lt Tail / License
C	TBD	—	Spare
D	2609	BRN/WHT	RT Tail
E	619	GRN DK	RR Stop/Turn
F	24	GRN LT	Back Up
G	350	BLK	Gnd Zone 3B
H	TBD	—	Spare



Tail Lamp Connector Location

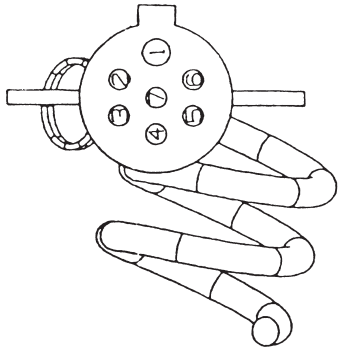


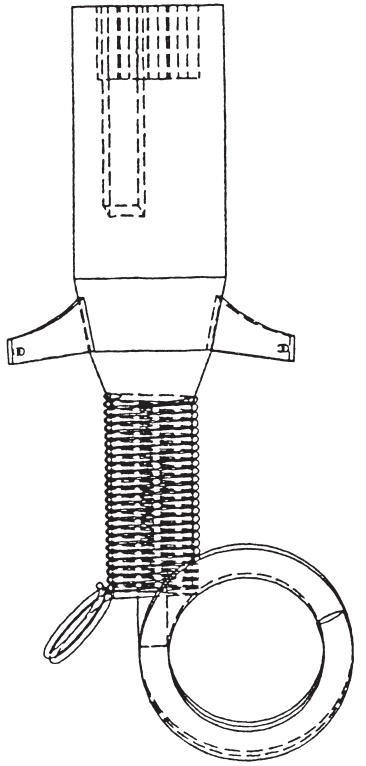
7-Way Tractor Connector – Family 3

Connector	Packard 280/630 Series	
connector	12077629	
terminal	15304720	3mm
seal	15366065	5mm
terminal	15326004	3mm
seal	12191235	5mm

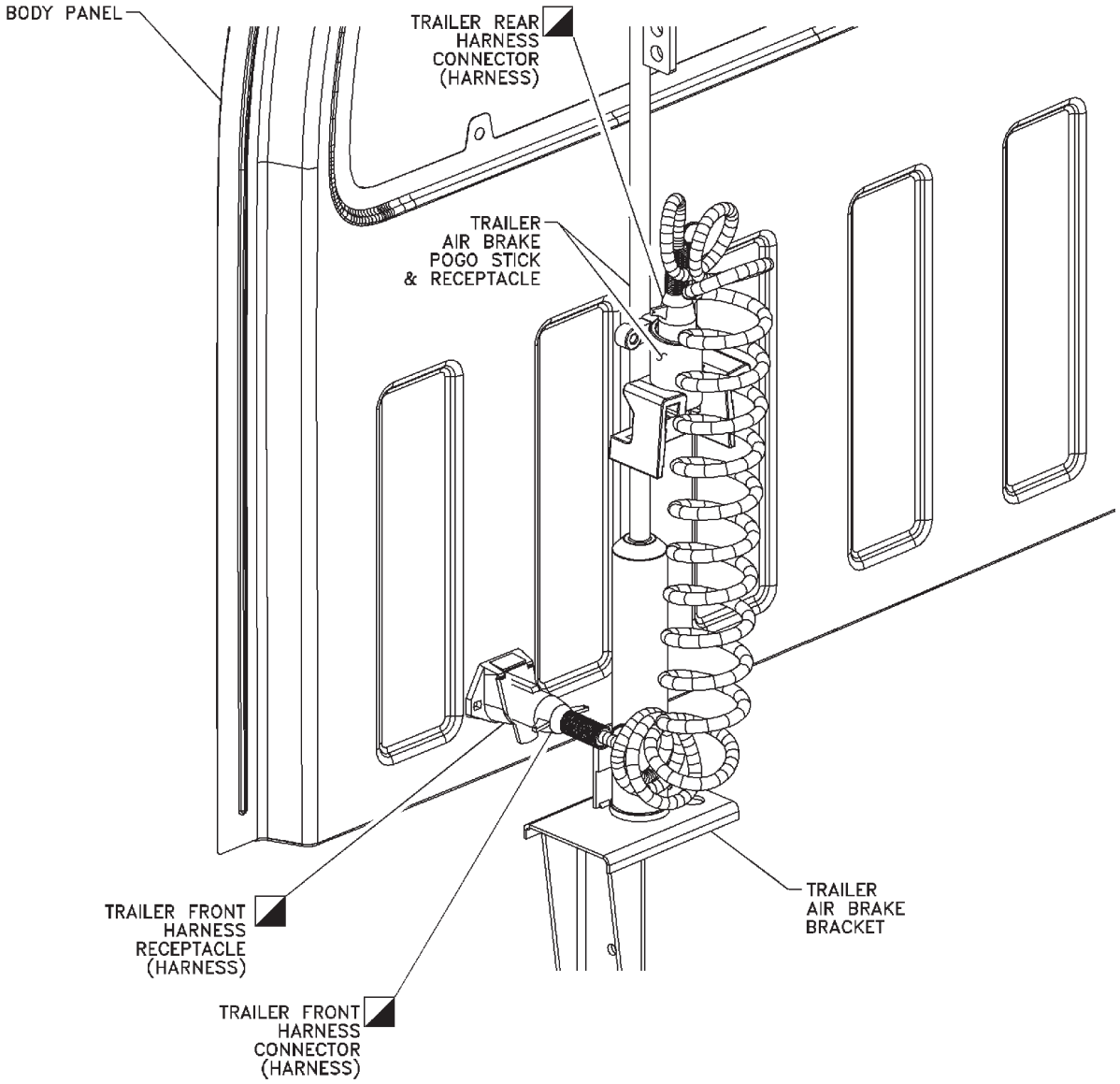
Pin	Wire		Function
	Ckt #	Color	
1	22	WHT	Tractor Gnd Zone 7B
2	1412	BLK	Marker Lamp
3	318	YEL	Lt Turn/Hazard
4	1411	RED	Brake (1)
5	319	GRN DK	Rt Turn/Hazard
6	9	BRN	Park Lamp
7	1413	BLU DK	ABS Power & Multiplexed Signal

NOTES:
(1) 30A maxi fuse. See page B-4.





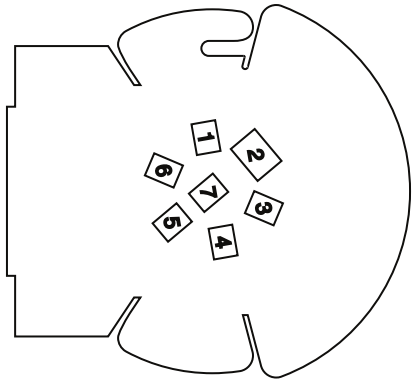
Tractor Connector – Family 3 Location

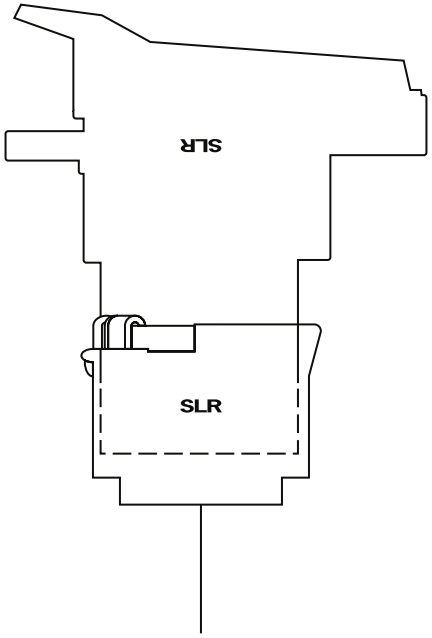

BODY PANEL
TRAILER REAR HARNESS CONNECTOR (HARNESS)
TRAILER AIR BRAKE POGO STICK & RECEPTACLE
TRAILER AIR BRAKE BRACKET
TRAILER FRONT HARNESS RECEPTACLE (HARNESS)
TRAILER FRONT HARNESS CONNECTOR (HARNESS)

7-Way Trailer Connector – Family 2

Connector	Packard 280/630 Series	
connector	15354653	
terminal	12119853	3mm
terminal	15317332	5mm
seal	12015323	

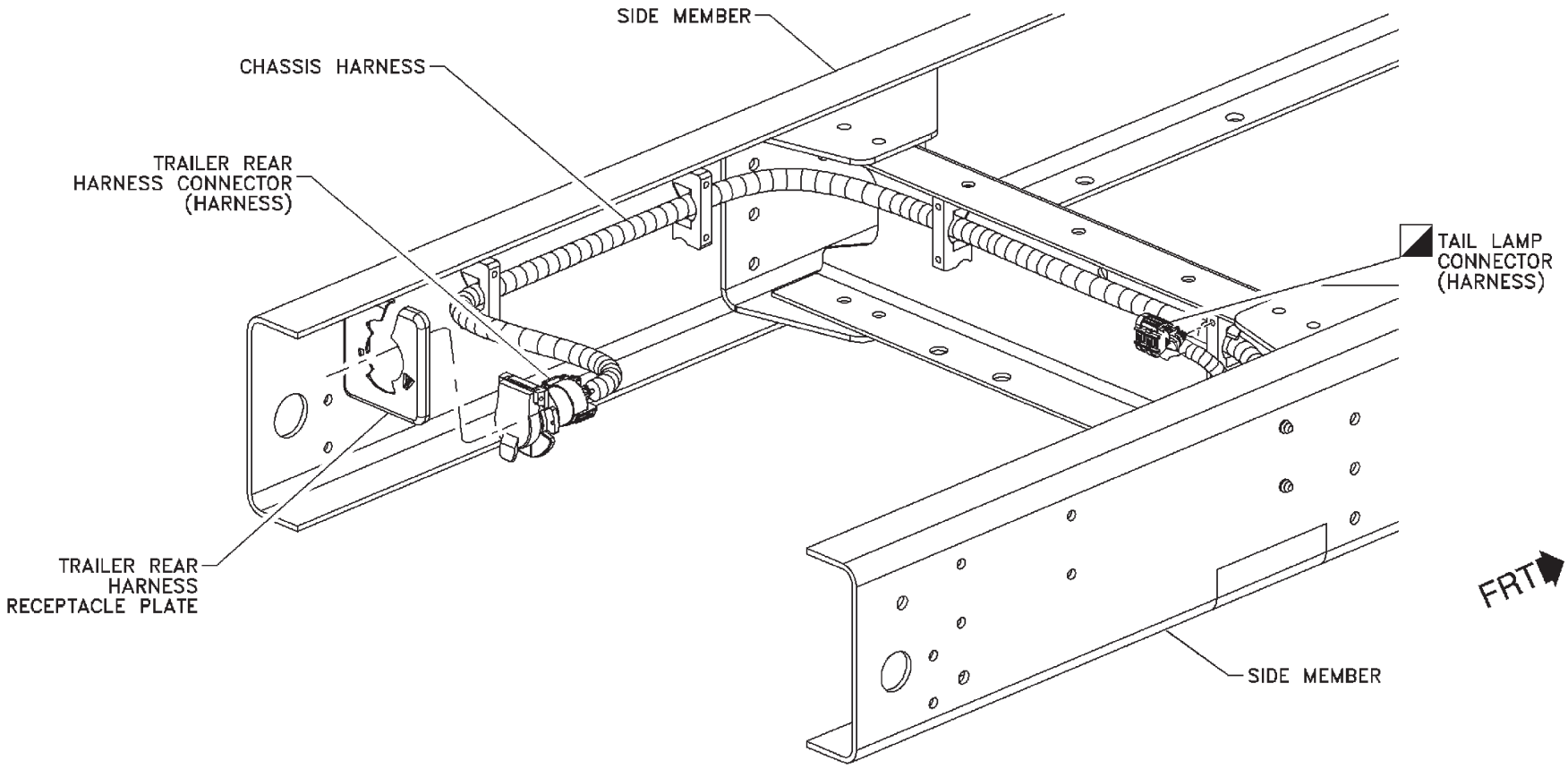
Pin		Wire		Function
		Ckt #	Color	
7	A	24	GRN LT	Back Up
2	B	22	WHT	Tractor Gnd Zone 12A
3	C	47	BLU DK	Aux Elec Brake (1)
4	D	319	GRN DK	Rt Turn/Hazard
5	E	642	RED	Electric Brake Power (2)
6	F	9	BRN	Park Lamp
1	G	318	YEL	Lt Turn/Hazard





NOTES:
(1) Blunt cut end found under hood. See UI Bulletin #66.
(2) 30A maxi fuse. See page B-4.

Trailer Connector Location – Family 2

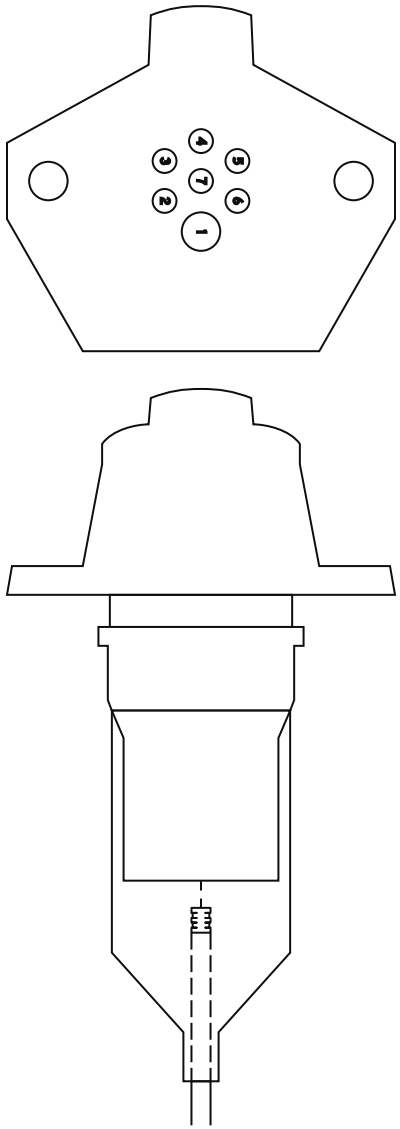


7-Way Trailer Connector – Family 3

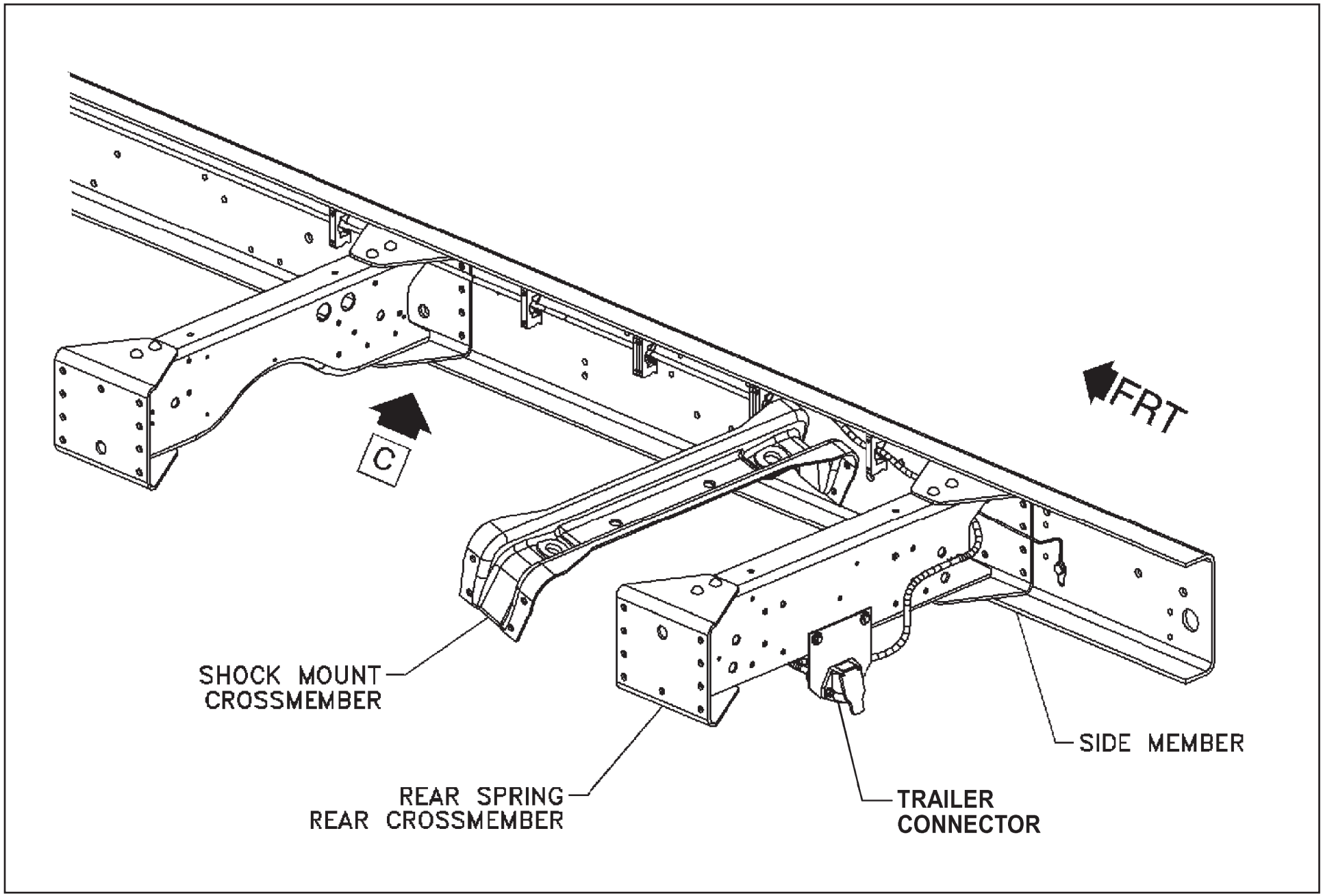
Connector	Packard 280/630 Series	
connector	12077629	
terminal	15304720	3mm
seal	15366065	5mm
terminal	15326004	3mm
seal	12191235	5mm

Pin	Wire		Function
	Ckt #	Color	
1	22	WHT	Tractor Gnd Zone 12B
2	1412	BLK	Marker Lamp
3	318	YEL	Lt Turn/Hazard
4	1411	RED	Brake (1)
5	319	GRN DK	Rt Turn/Hazard
6	9	BRN	Park Lamp
7	1413	BLU DK	ABS Power & Multiplexed Signal

NOTES:
(1) 30A maxi fuse. See page B-4.



Trailer Connector Location – Family 3



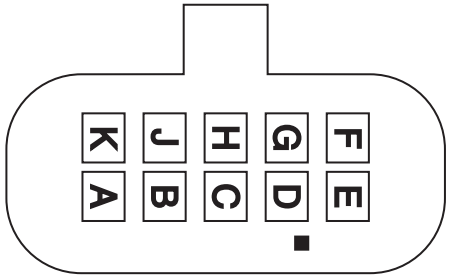
10-Way Transmission Optional Connector

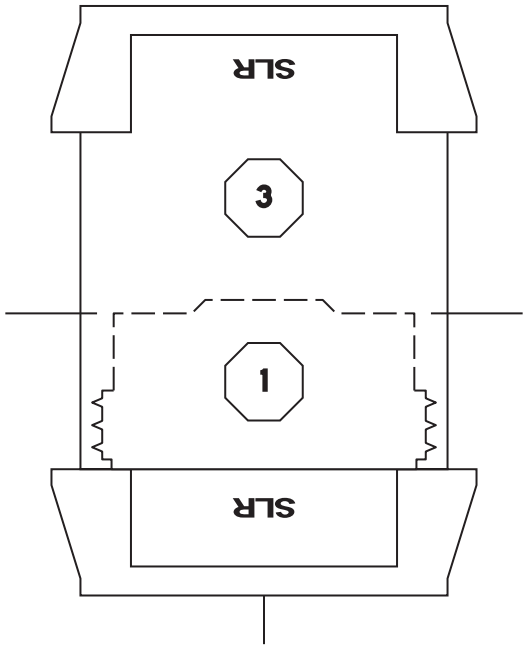
	TRUCK SIDE	BODY BUILDER SIDE	
Typical connector	PPN 12065425 (F)	PPN 12045808 (M)	SPN 12117372
Typical terminal	PPN 12048074	PPN 12177150	SPN 12177150
Typical cable seal	PPN 12048086	PPN 15324973	SPN 12048086

ALLISON LCT TRANS			
Pin	**Wire**		**Function**
	Ckt #	**Color**	
A	1146	PPL	Range Indicator
B	1479	YEL	Auto Neutral
C	2522	YEL	PTO Status
D	N/C	—	—
E	N/C	—	—
F	1147	TAN	Range Inhibit
G	N/C	—	—
H	407	BLK	Analog Gnd
J	476	BLK	Digital Gnd
K	1480	BLU LT	PTO Output

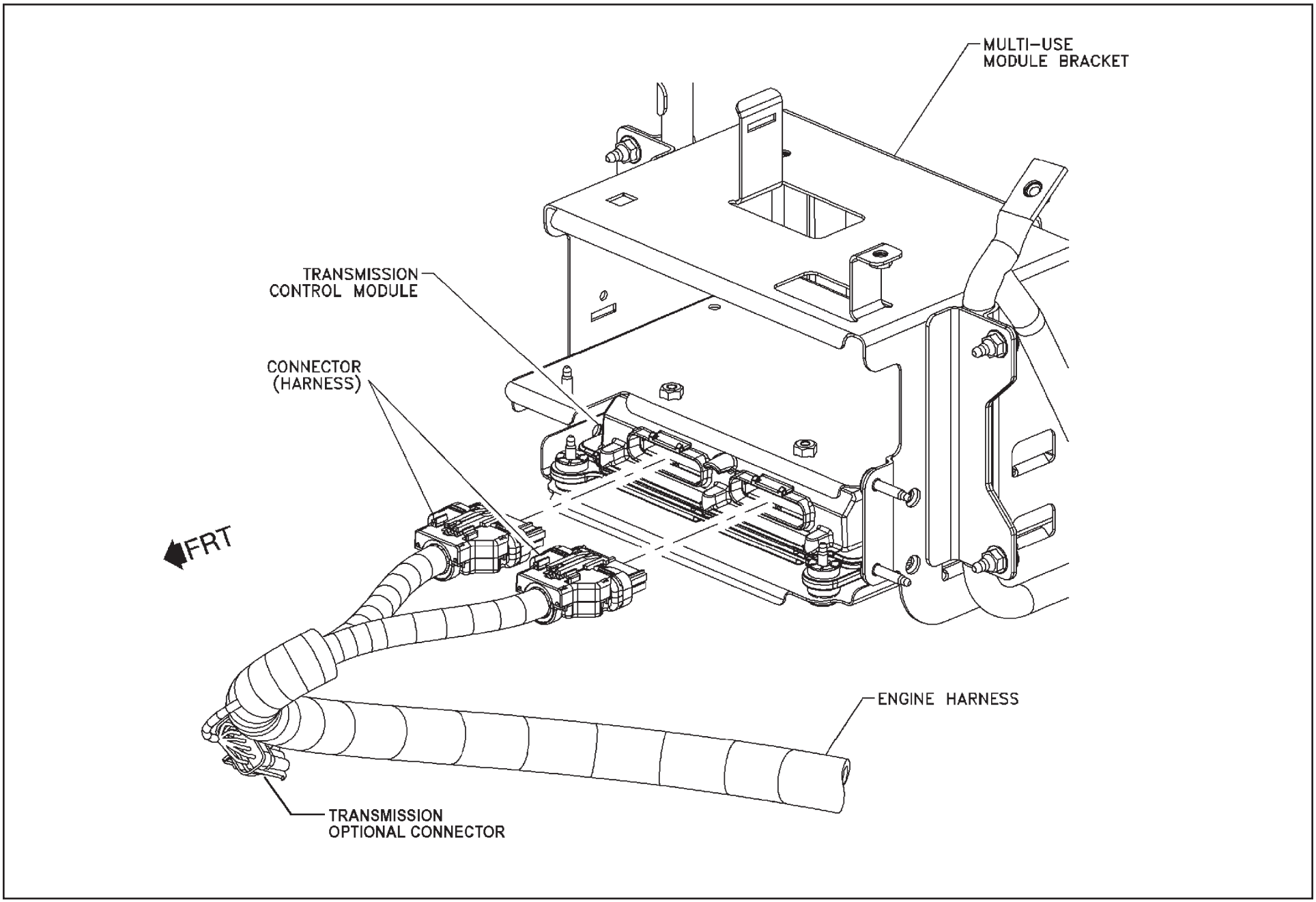
ALLISON MD TRANS			
A	1146	PPL	Range Indicator
B	1479	YEL	Auto Neutral
C	915	YEL	PTO Enable
D	1481	YEL	Aux Hold
E	1148	GRA	Sump Temp
F	1147	TAN	Range Inhibit
G	N/C	—	—
H	407	BLK	Analog Gnd
J	476	BLK	Digital Gnd
K	1480	BLU LT	PTO Engage

PPN = Production Part Number SPN = Service Part Number





Transmission Optional Connector Location



10-Way Upfitter PTO Connector

	TRUCK SIDE	BODY BUILDER SIDE	
Typical connector	PPN 12065425 (F)	PPN 12045808 (M)	SPN 12117372
Typical terminal	PPN 12048074	PPN 12177150	SPN 12177150
Typical cable seal	PPN 12048086	PPN 15324976	SPN 12089678

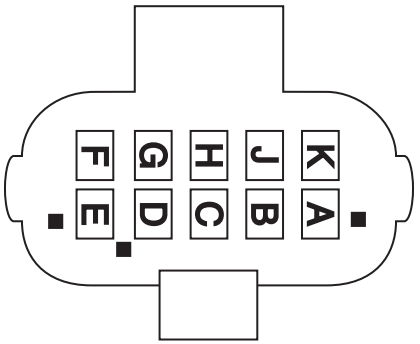
L18/LLY/LG4

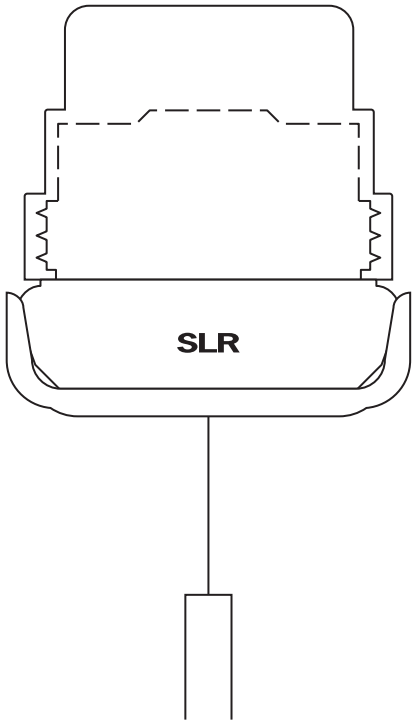
Pin	Wire		Function
	Ckt #	Color	
A	N/C	—	—
B	494	BLU LT	PTO Kill
C	488	GRN LT	PTO Enable
D	250	BLK	GND
E	2663	PPL	Tap Up
F	488	GRN LT	PTO Enable
G	2522	YEL	PTO Feedback
H	2561	WHT	Engage
J	2664	TAN	Tap Down
K	N/C	—	—

LG5

A	250	BLK	GND
B	494	BLU LT	PTO Kill Switch
C	2664	TAN	Tap Down
D	451	BLK/WHT	Engine GND
E	451	BLK/WHT	Engine GND
F	2663	PPL	Tap Up
G	2522	YEL	FEED BACK
H	2561	WHT	Engage
J	451	BLK/WHT	GND
K	N/C	—	—

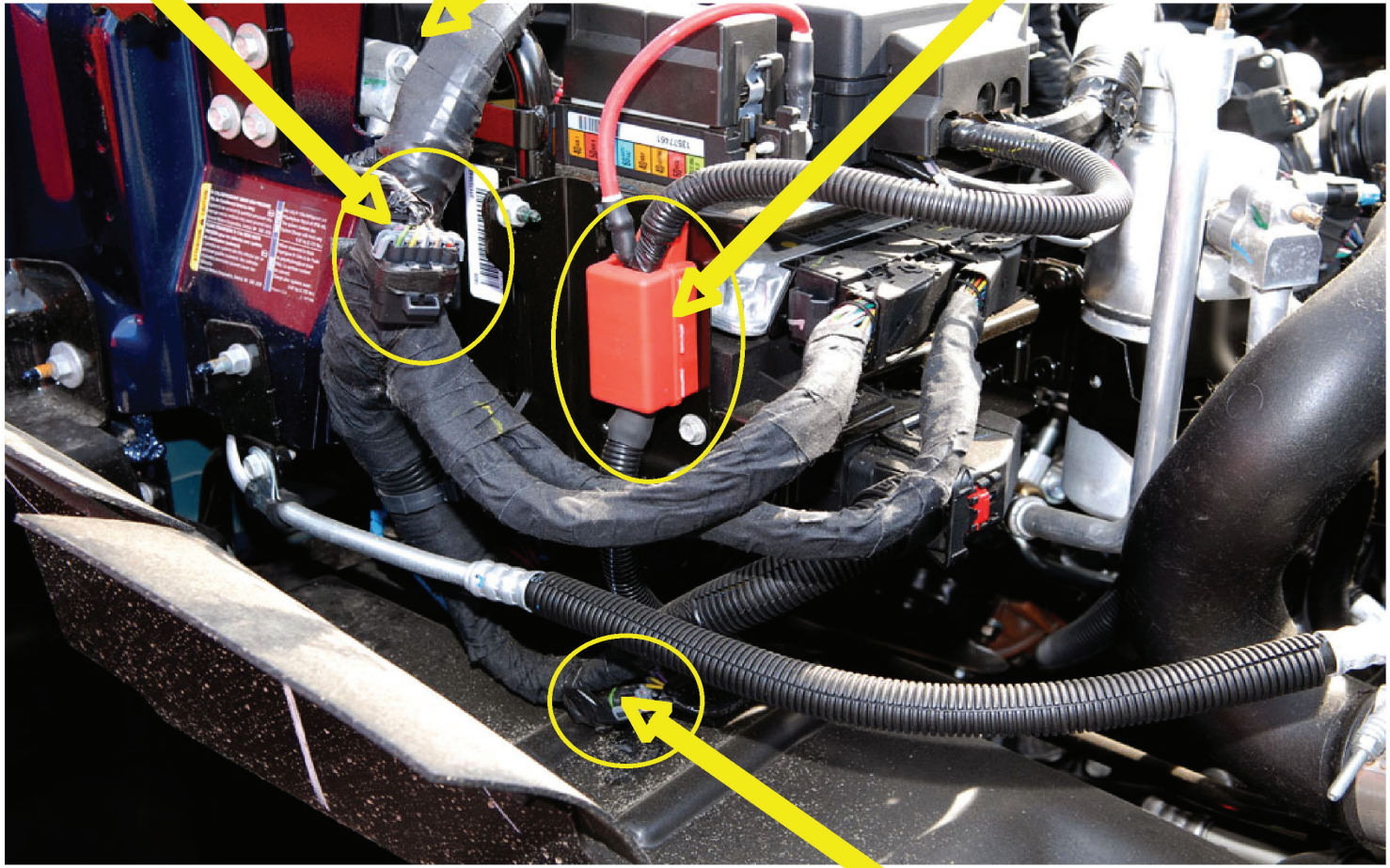
PPN = Production Part Number SPN = Service Part Number



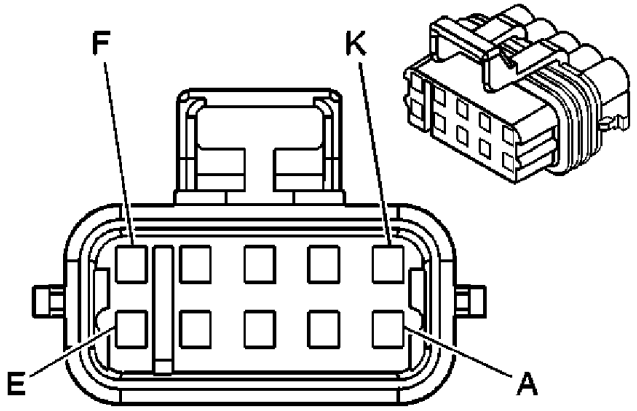


Upfitter PTO Connector Location

UNDERHOOD VIEW – RIGHT HAND SIDE



C127 Engine Chassis Harness to Remote Power Take-off (PTO) (LF8)



Connector Part Information

OEM: 15318071

Service: 15306119

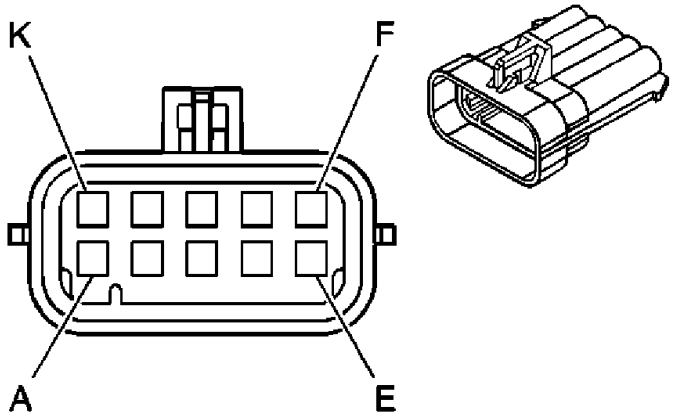
Description: 10-Way F Metri-Pack 150 Series Sealed (GY)

Terminal Part Information

Terminal/Tray: 12191819/8

Core/Insulation Crimp: 2/A

Release Tool/Test Probe: 15315247/J-35616-2A (GY)



Connector Part Information

OEM: 12052189

Service: 12167122

Description: 10-Way M Metri-Pack 150 Series Sealed (GY)

Terminal Part Information

Terminal/Tray: See Terminal Repair Kit

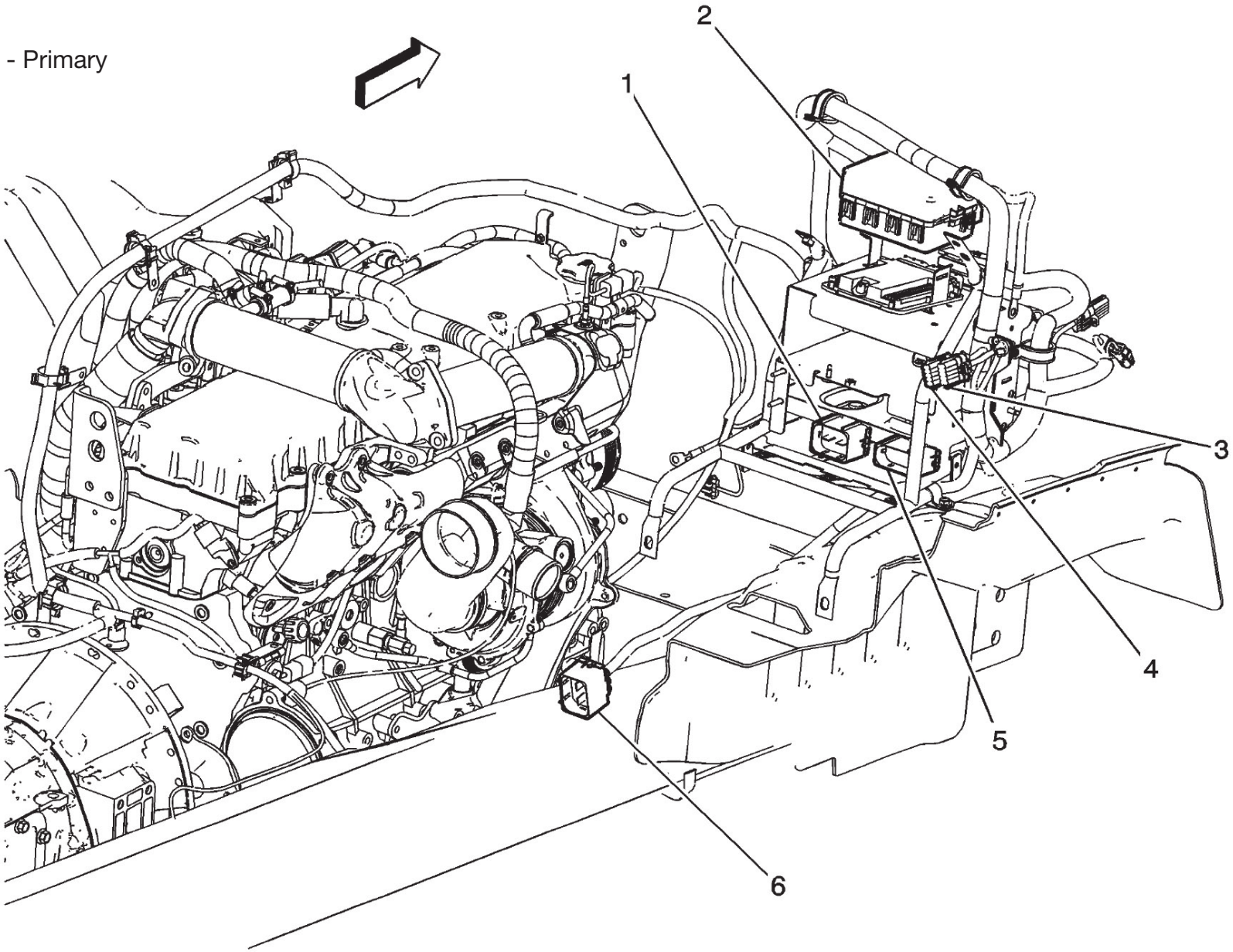
Core/Insulation Crimp: See Terminal Repair Kit

Release Tool/Test Probe: See Terminal Repair Kit

Pin	Wire	Circuit	Function	Pin	Wire	Circuit	Function
A	YE/BK	7607	Remote PTO Acceleration Ground	A	--	--	Remote PTO Usage
B	D-GN	7637	Remote PTO Acceleration Signal	B	--	--	Remote PTO Usage
C	GY	7606	Remote PTO Acceleration VCC	C	--	--	Remote PTO Usage
D	L-BU	7605	Remote PTO Ignore Brake Clutch Switch	D	--	--	Remote PTO Usage
E	PU	7608	Remote PTO Cab Control Disable Switch	E	--	--	Remote PTO Usage
F	WH/BK	7609	Remote PTO Set Speed B Switch	F	--	--	Remote PTO Usage
G	D-BU	7610	Remote PTO Set Speed A Switch	G	--	--	Remote PTO Usage
H	BN	7611	Remote PTO Resume Switch	H	--	--	Remote PTO Usage
J	PU	7612	Remote PTO Set Switch	J	--	--	Remote PTO Usage
K	--	--	Not Used	K	--	--	Remote PTO Usage

Right Rear Side Of Engine Compartment (LF8)

(1) C109
(2) Fuse Block - Primary
(3) C121
(4) C127



Schematic Description and Navigation Instructions

Background

The Schematics included in this document are part of GM's IVED drawing system. These are the official drawings used to develop vehicle programs, produce wire harnesses and develop service documentation. The following information is offered to help you understand how they are organized and how to use them.

Organization

It's impossible to put all the information on only one drawing. The vehicle is broken down by subsystem. The schematics are organized by subsystem number not by name. That's why the index doesn't follow an alphabetical order of the subsystems.

A number has been added on the bottom right of each page that indicates the subsystem number, revision level, and page number.

Example:

The first sheet is **H83010a_001_01** *(see page D-3)*

H83010a_001_01	The "*h83010a"* is the Object ID on the drawing and represents the sub-system.
H83010a_001_01	The "*010"* represents the sub-system, in this case Power Distribution. Other examples are "014" for Ground Distribution and "020" for Engine Controls.
H83010a_001_01	The "*a*" represents the first or only drawing for that sub-system. In this case multiple Power Distribution Schematics are included. "a" is for L18, "b" for LF8, "c" for LF6, and "d" for LMM engines.
H83010a_001_01	The "*001*" represents the revision level and is not important for most of your needs.
H83010a_001_0**1**	The "*01*" represents panel set one on the schematic and indicates the page number. This Schematic has nine pages for example.

Navigation

Every wire in the vehicle is given a unique circuit number. These numbers are indicated on the schematics in bold type next to the wire. An entire subsystem usually can't be represented by only one page. How do you determine where a wire is connected to once it leaves the page? Either the signal is connected somewhere else in the same subsystem or it goes to another subsystem.

(continued on next page)

(Overview — continued from previous page)

Arrows and "Home" Plates

An Arrow is used to indicate that the signal stays within the same subsystem. The schematic indicates the circuit number and (page #) next to the arrow. A pointed arrow (→) points to where it's going to. A receiving arrow (➤—) shows what page it came from.

A "Baseball Home Plate" ⬡ or ⌂ indicates that the signal goes to another subsystem.

Example:

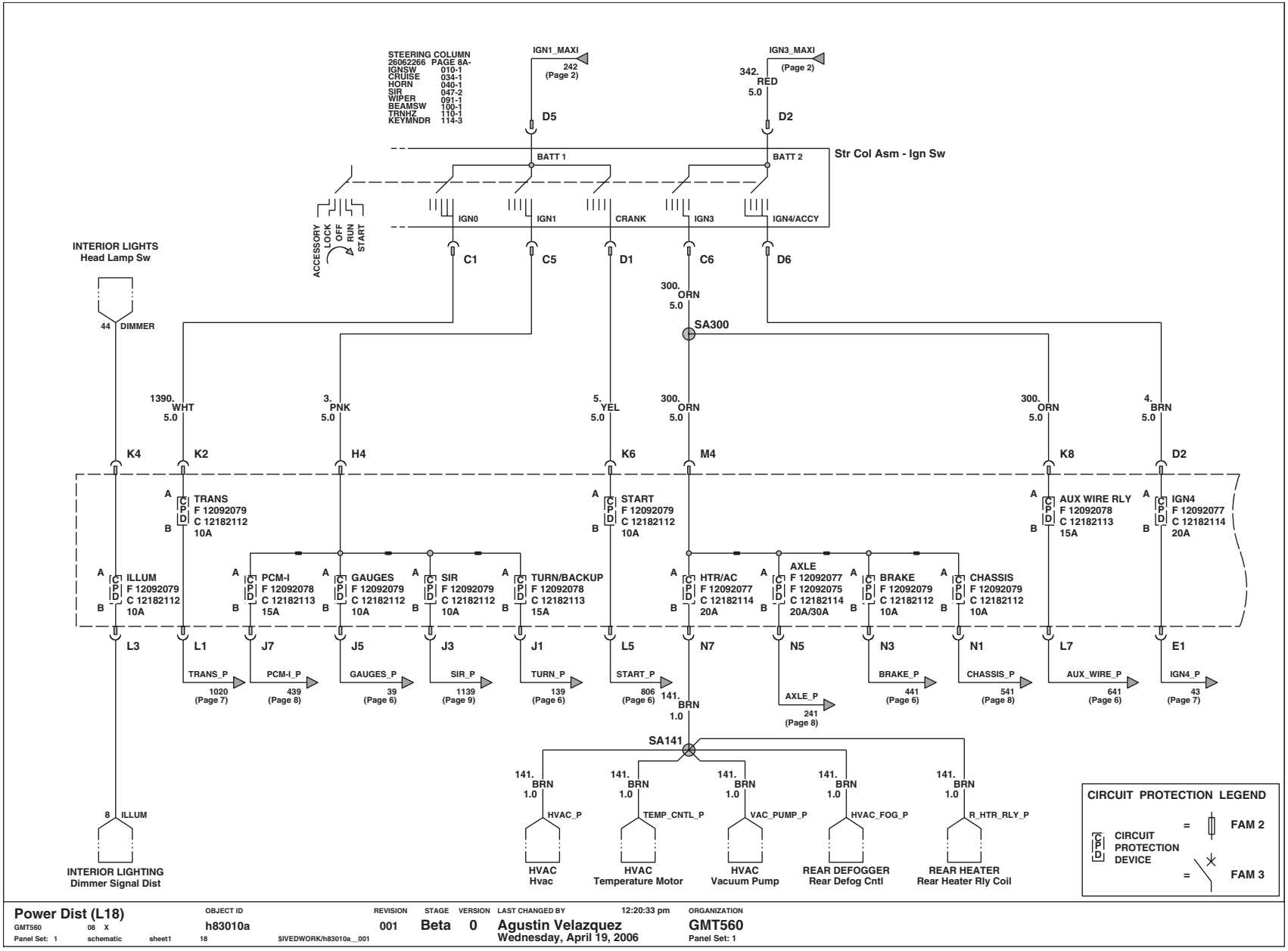
A ⌂ is shown on the bottom left of the first schematic Power Distribution H83010a_001_01. *(see page D-3)*
This is an eight circuit and the "baseball plate" indicates which subsystem it goes to. It is marked:
Interior Lighting

Two "baseball plates" are shown so you look for the eight circuit to identify the proper circuit.
Fuse protection is shown in the "baseball plate."

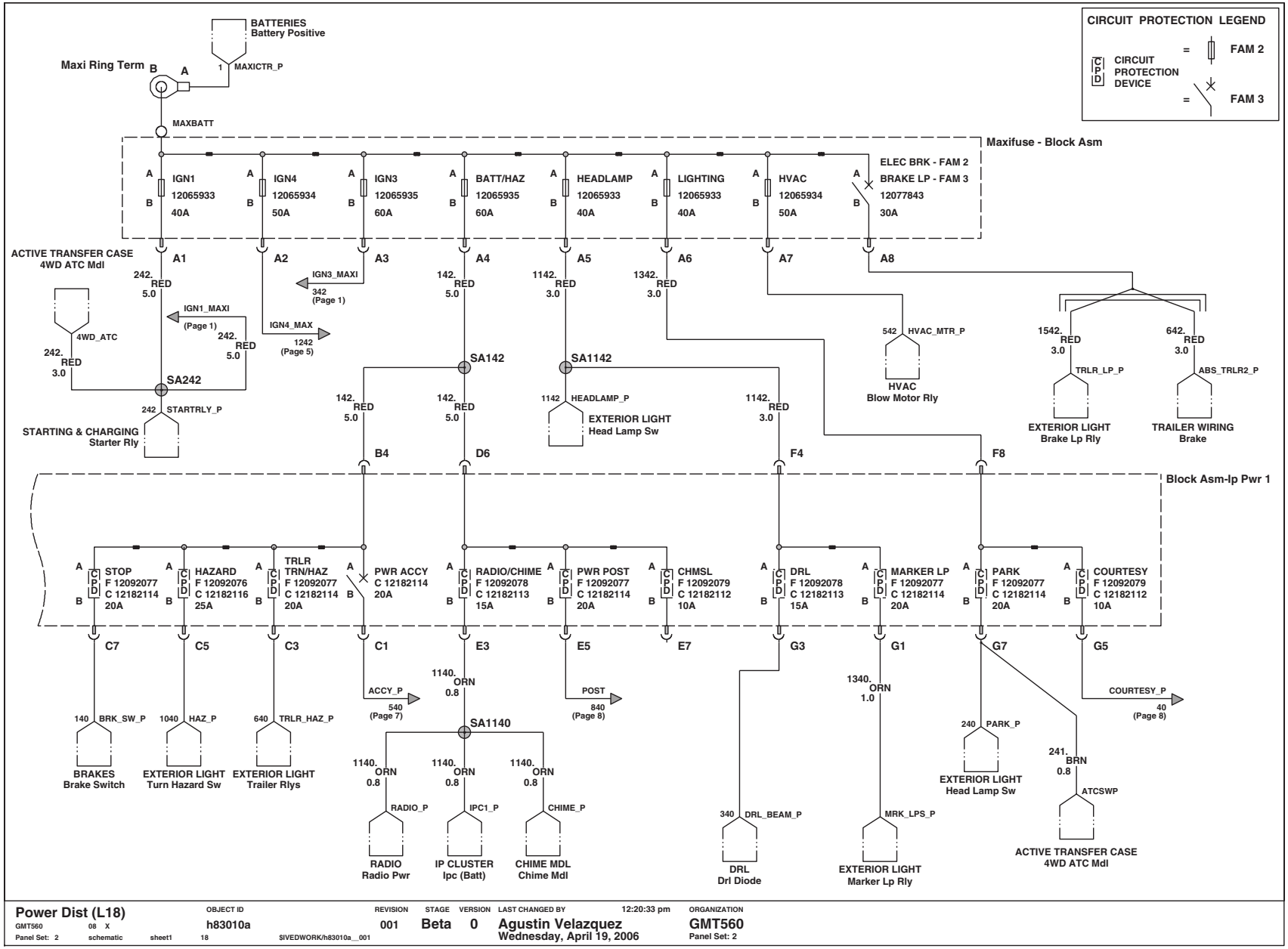
Other Information

Other information on the schematics are wire color and size. The size is shown in square mm. Connector information is indicated for devices. Terminal assignments are shown for devices. The connector PN is for the harness end not the device.

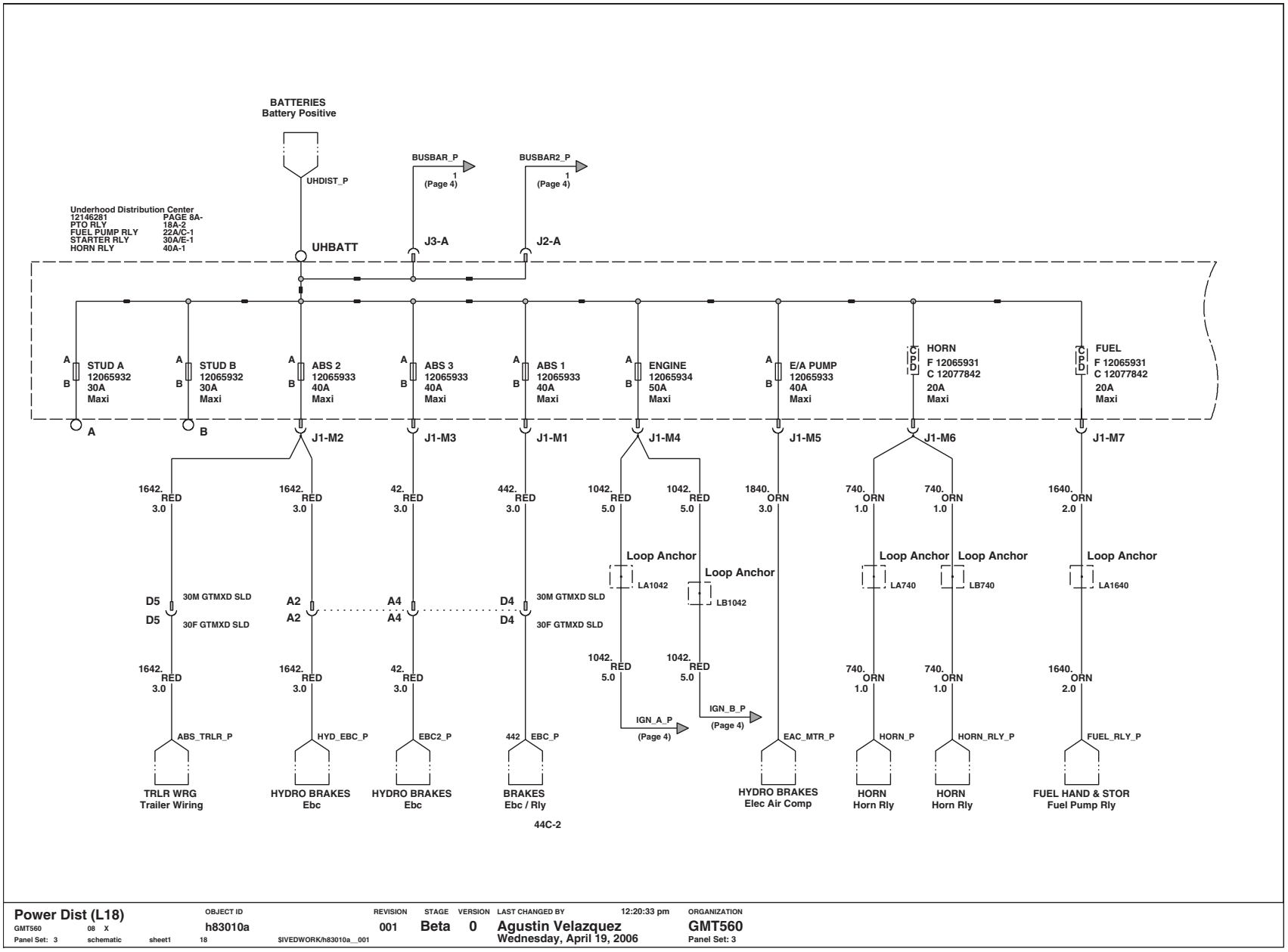
Power Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas



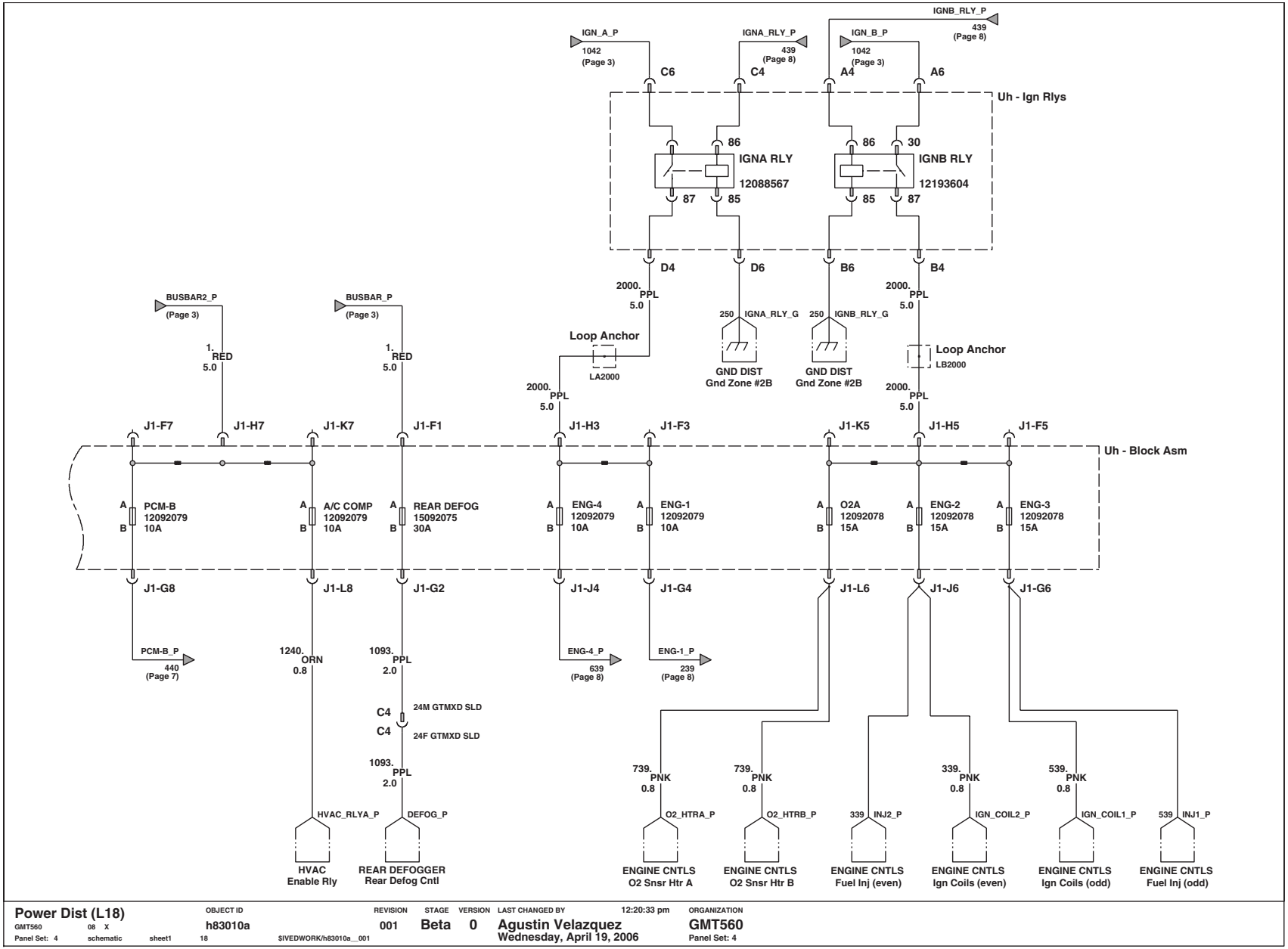
Power Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)



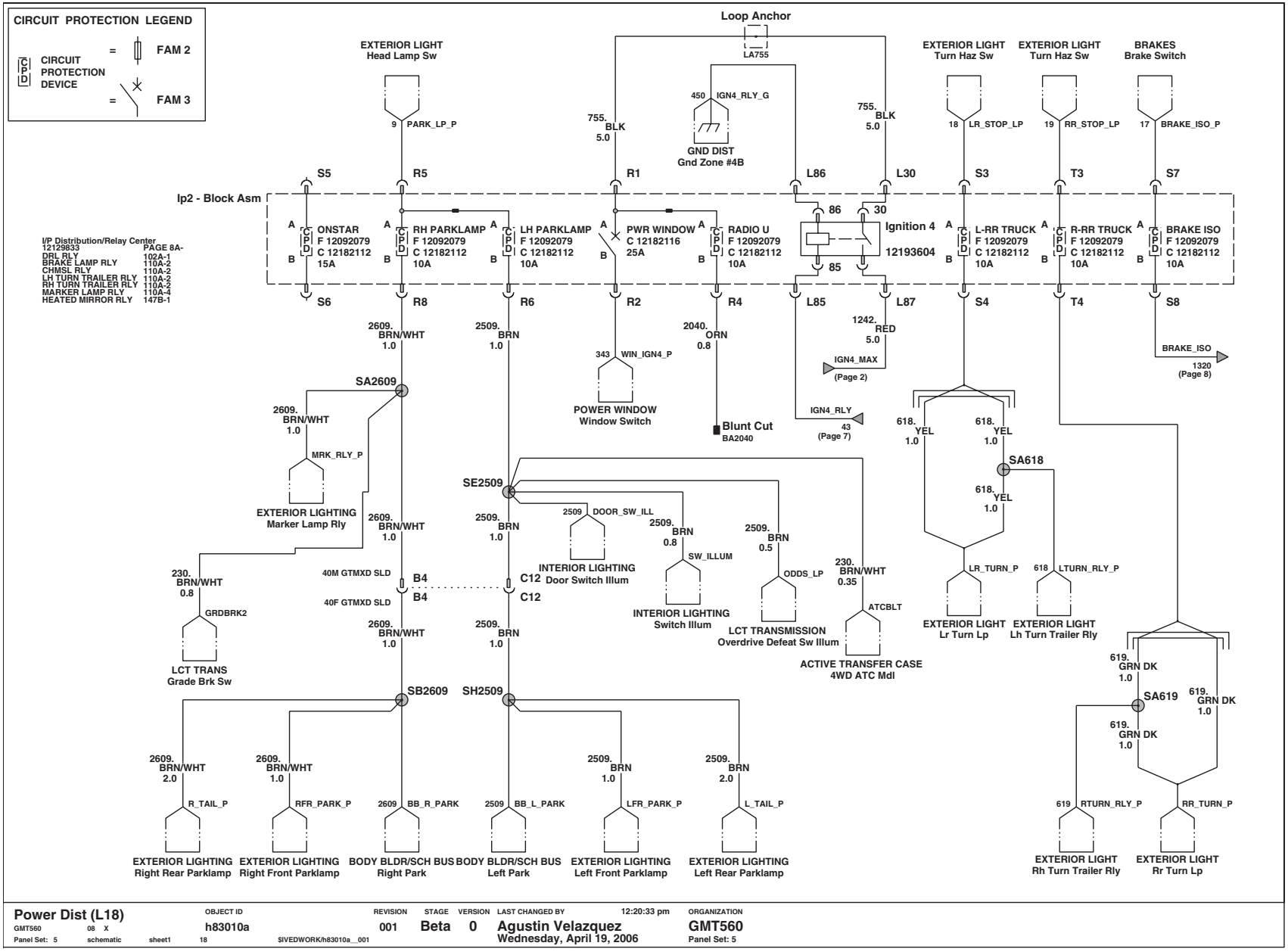
Power Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)



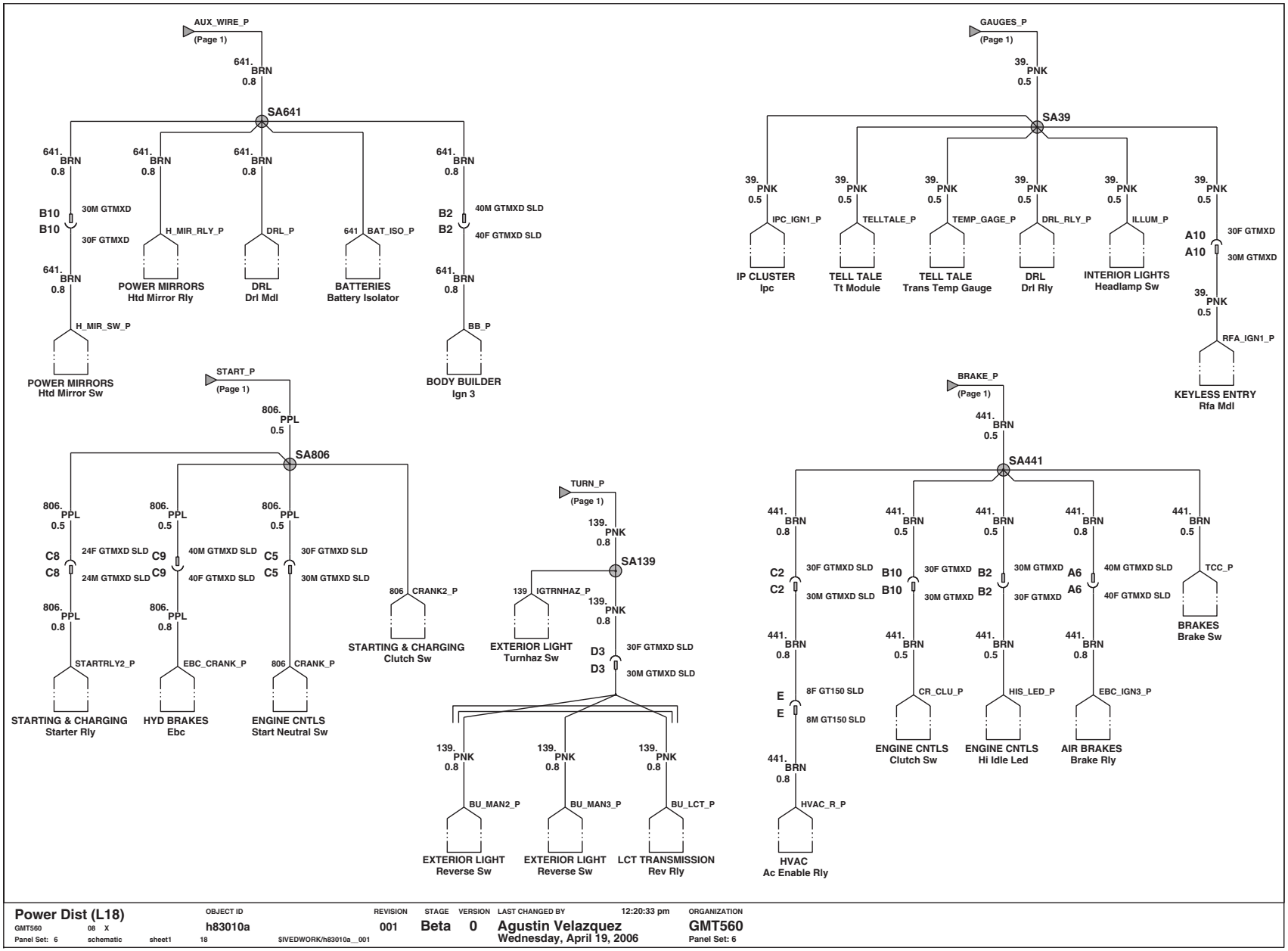
Power Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)



Power Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)

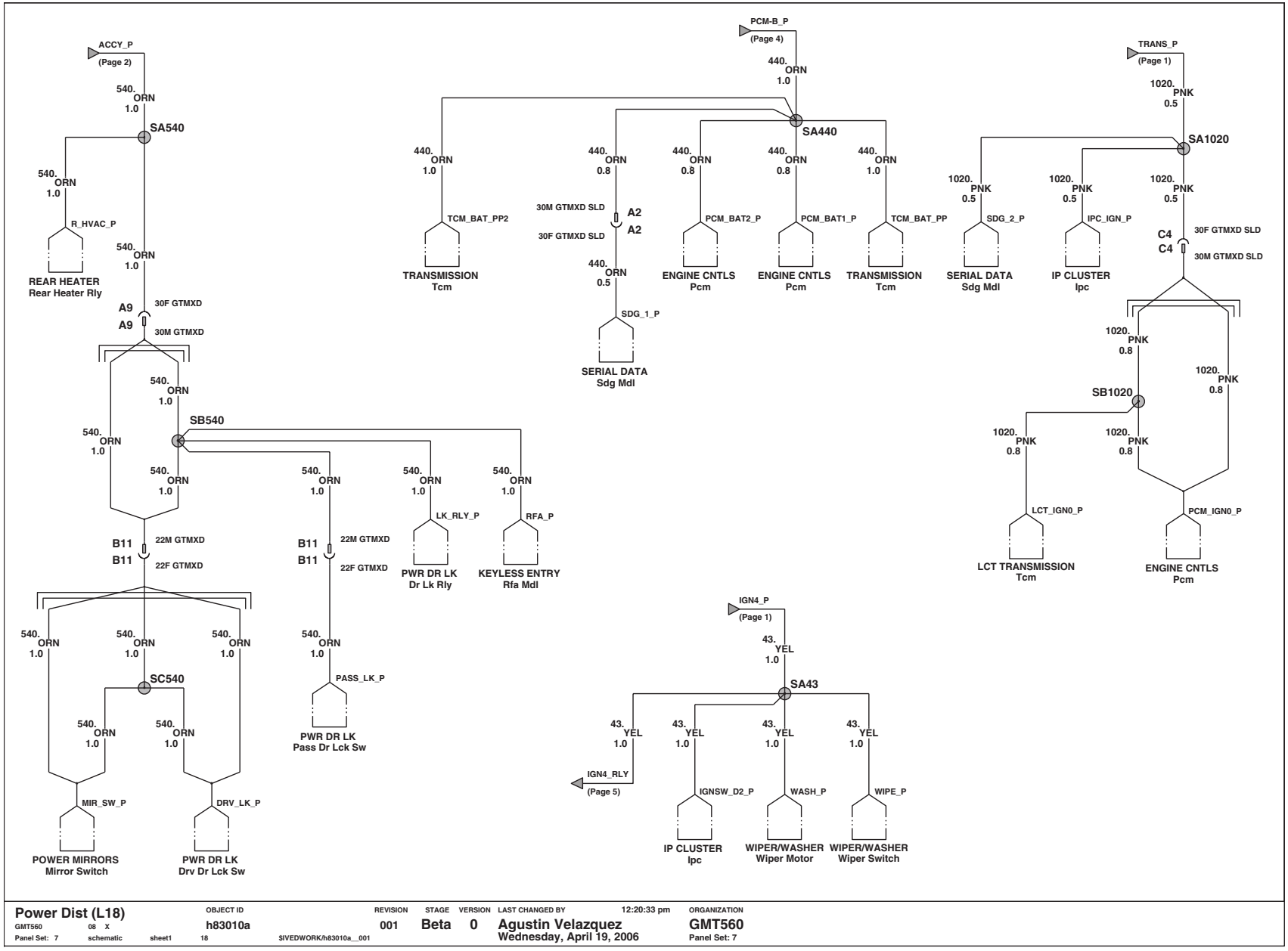


Power Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)

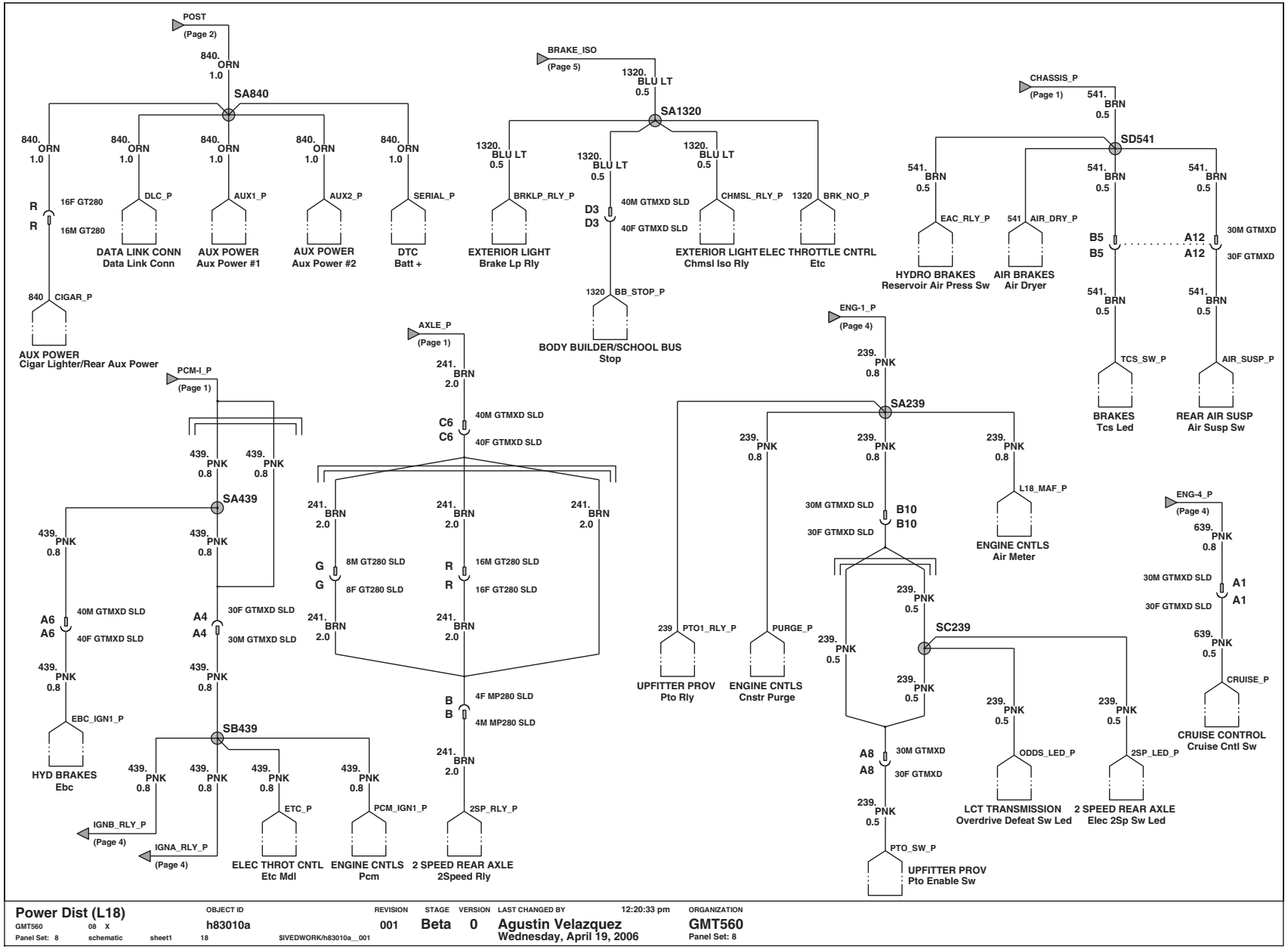


Power Dist (L18)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:20:33 pm	ORGANIZATION
GMT560 08 X	h83010a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 6 schematic sheet1 18 $\VEDWORK\h83010a__001					Wednesday, April 19, 2006		Panel Set: 6

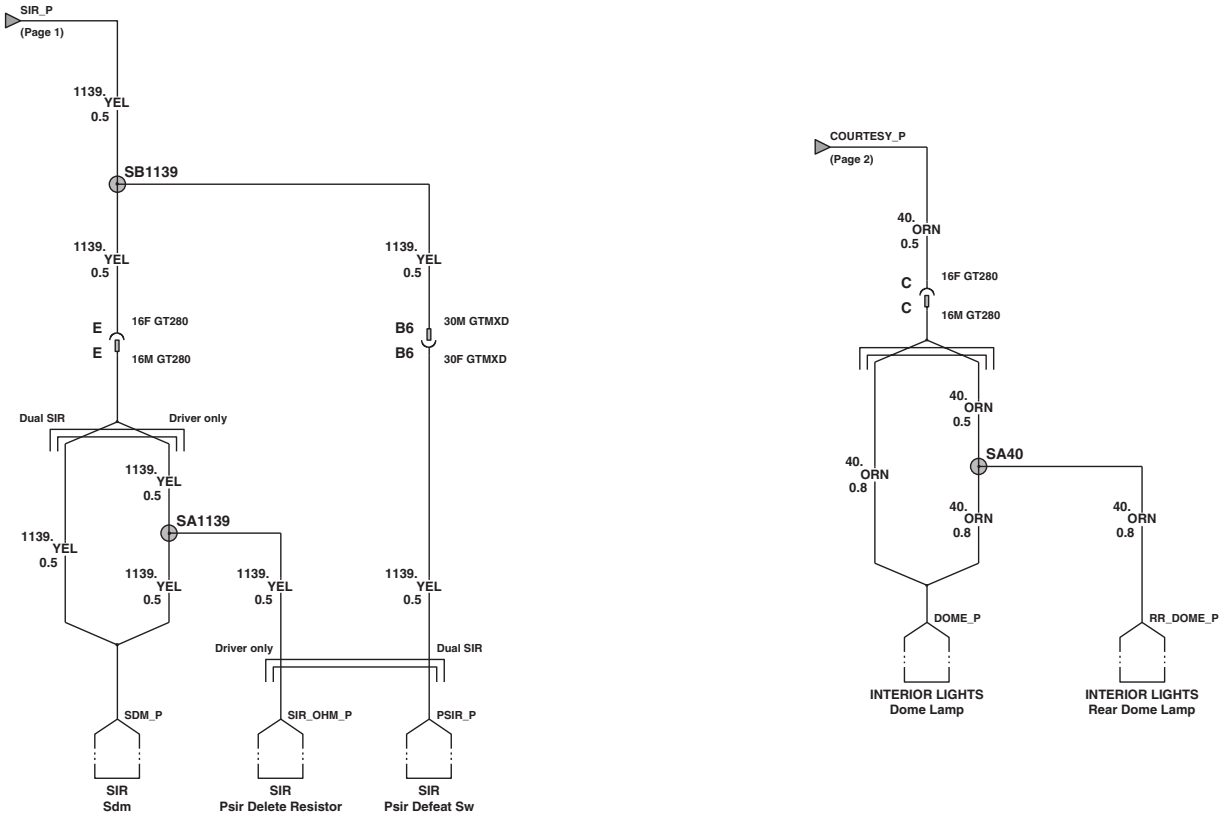
Power Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)



Power Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)

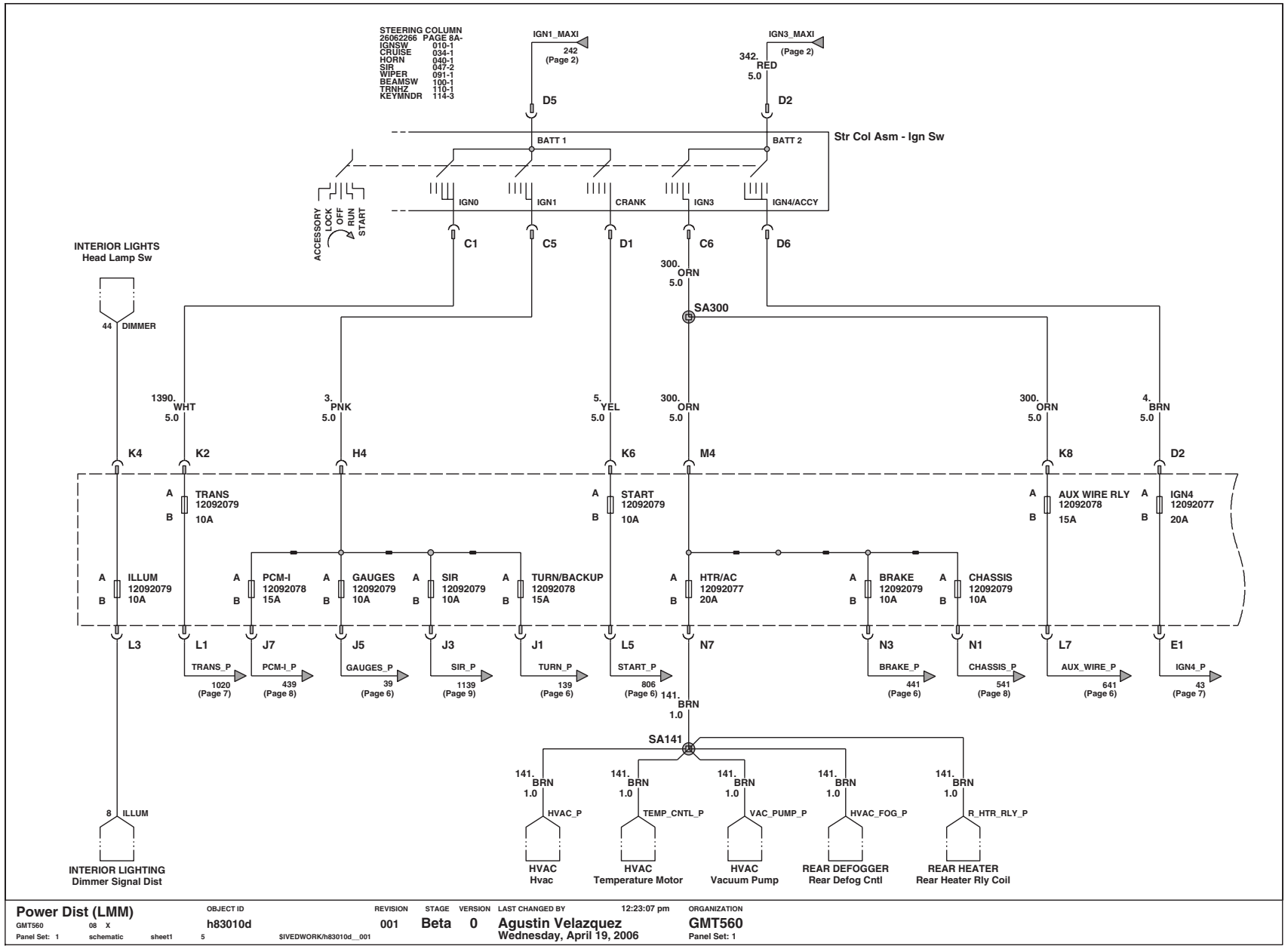


Power Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)

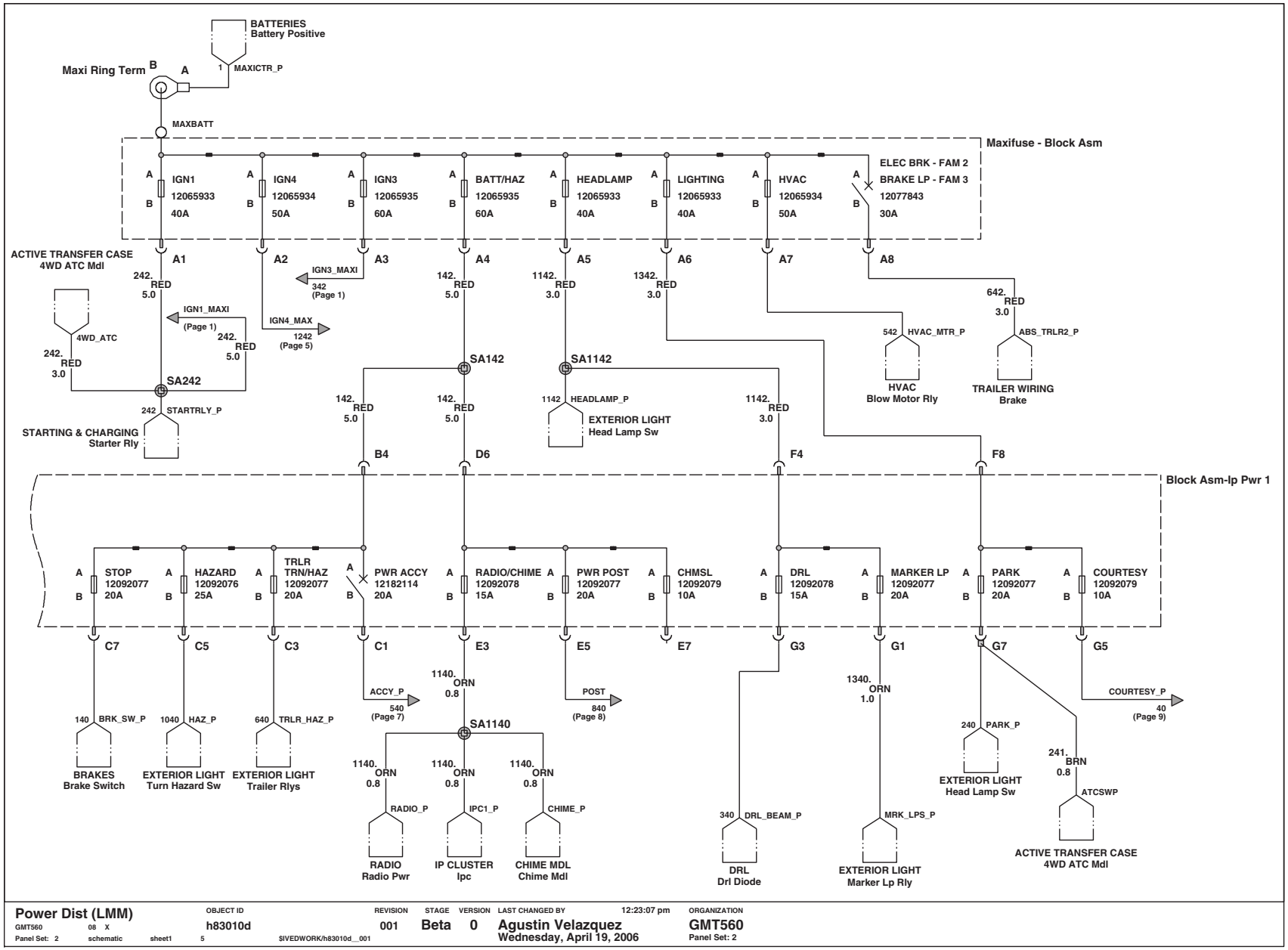


Power Dist (L18)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83010a	001	Beta	0	Agustin Velazquez	12:20:33 pm	GMT560
Panel Set: 9 schematic sheet1 18	$IVEDWORK/h83010a__001				Wednesday, April 19, 2006		Panel Set: 9

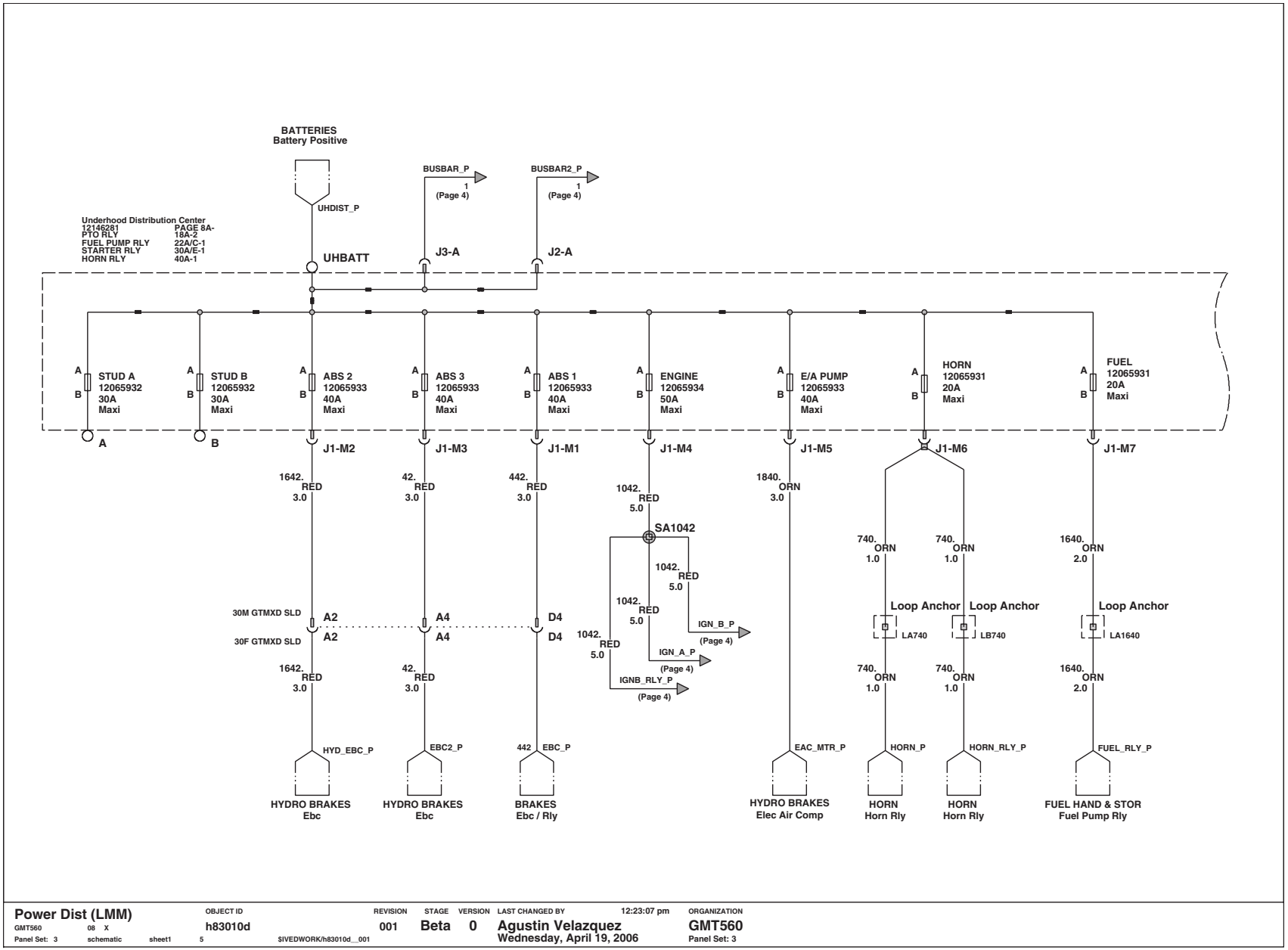
Power Distribution - (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel



Power Distribution - (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)

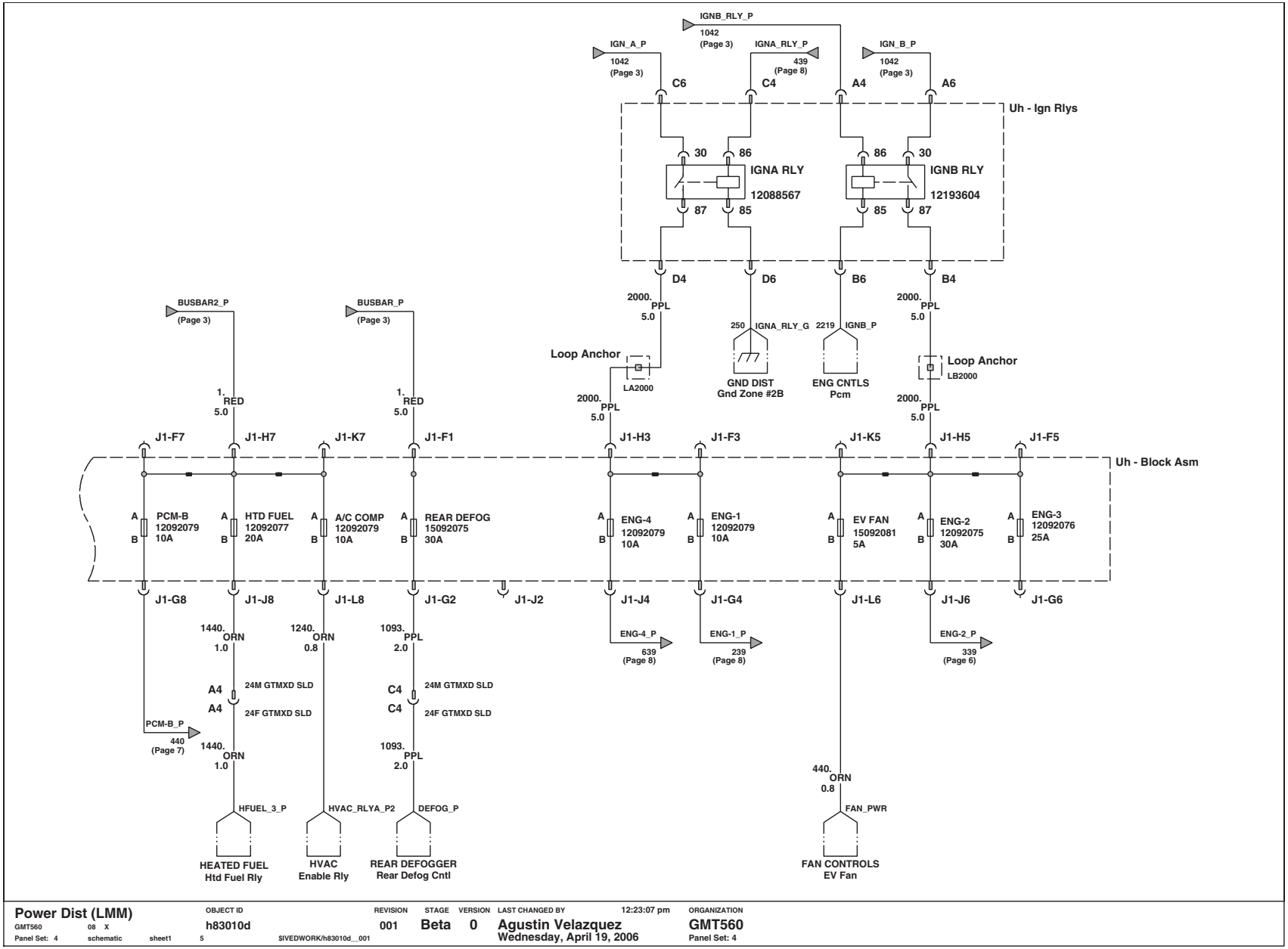


Power Distribution - (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



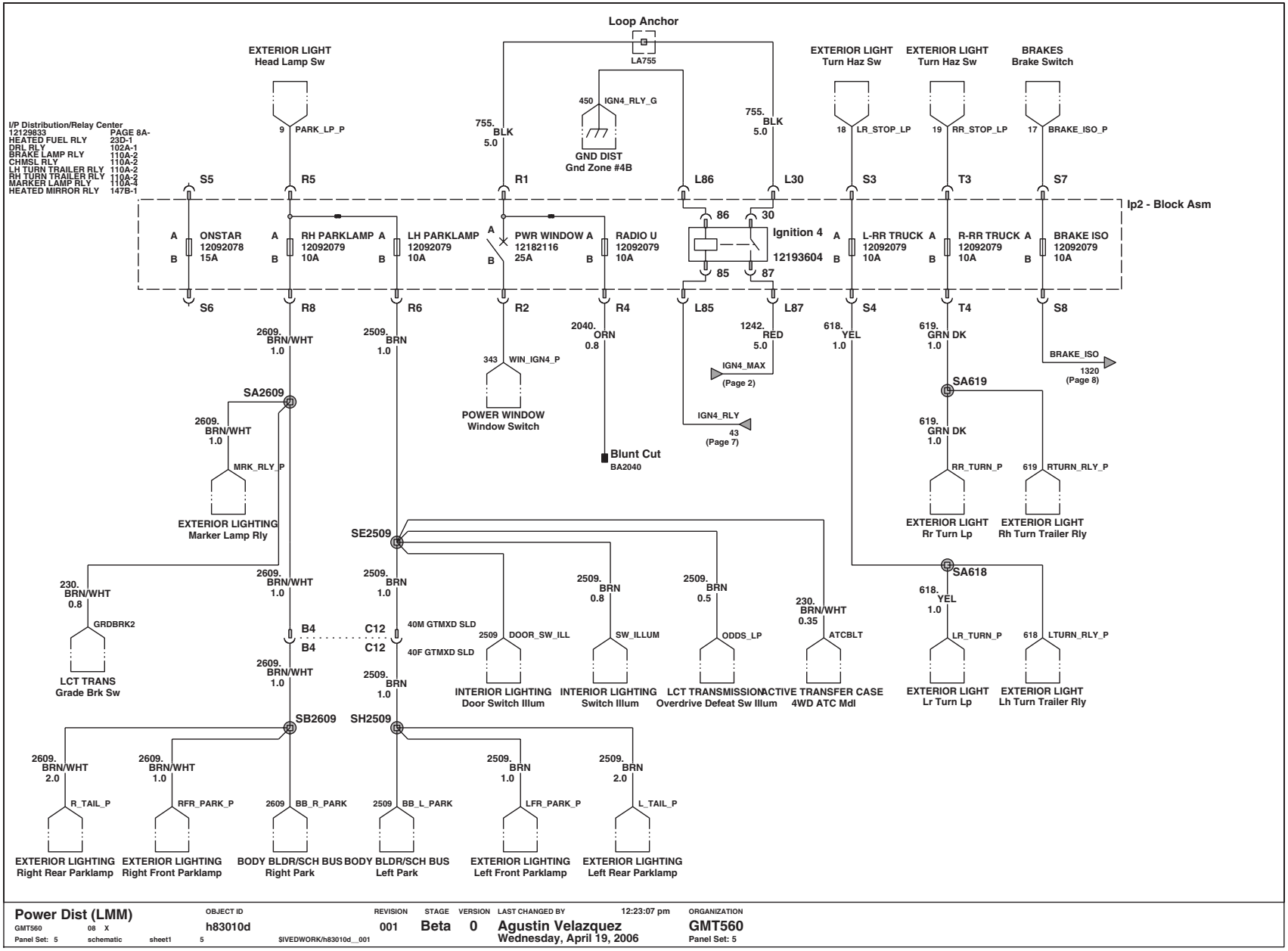
Power Dist (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83010d	001	Beta	0	Agustin Velazquez	12:23:07 pm	GMT560
Panel Set: 3 schematic sheet1 5	$IVEDWORK/h83010d__001				Wednesday, April 19, 2006		Panel Set: 3

Power Distribution - (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)

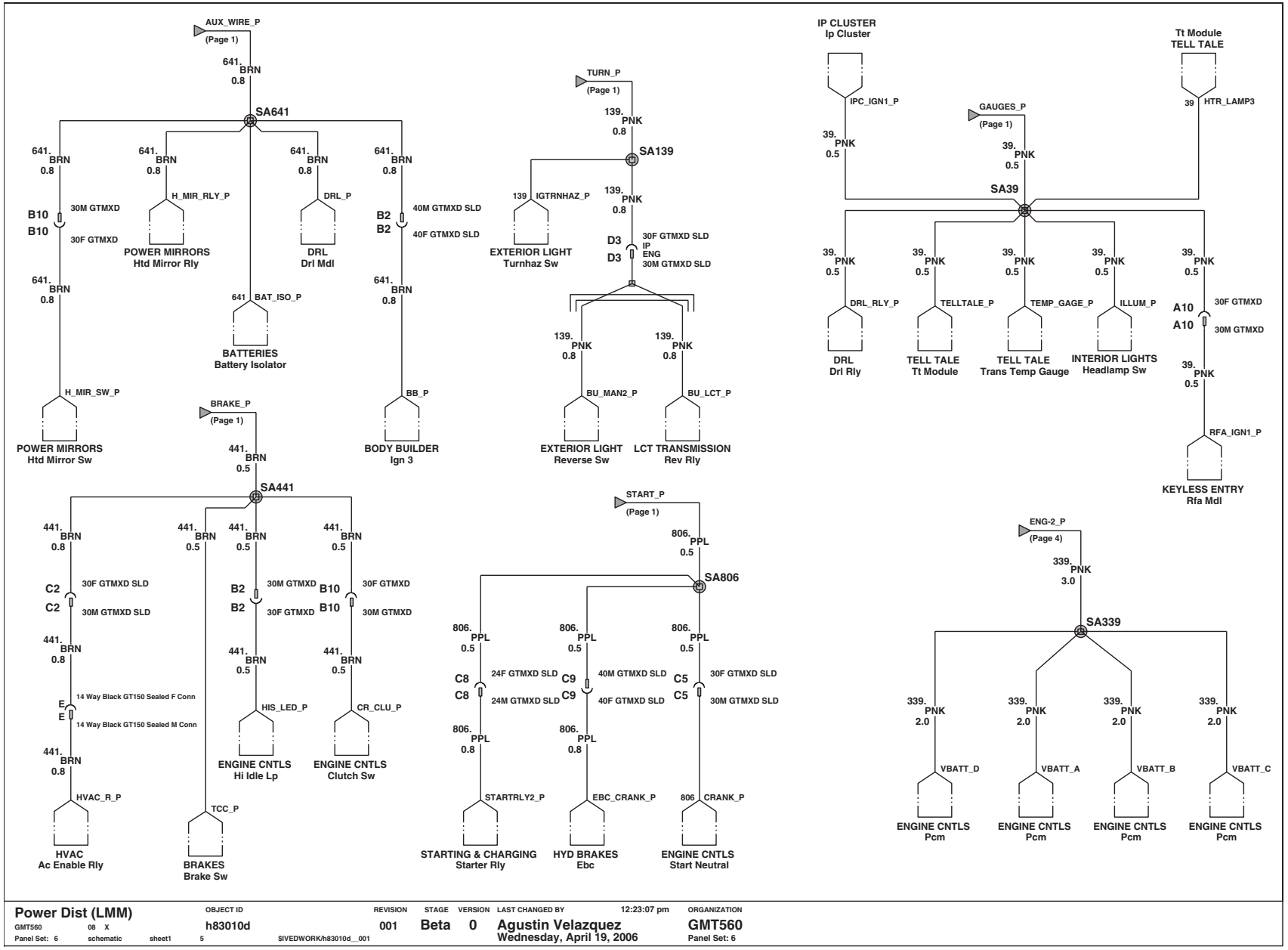


Power Dist (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83010d	001	Beta	0	Agustin Velazquez	12:23:07 pm	GMT560
Panel Set: 4 schematic sheet1 5	$IVEDWORK/h83010d__001				Wednesday, April 19, 2006		Panel Set: 4

Power Distribution - (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)

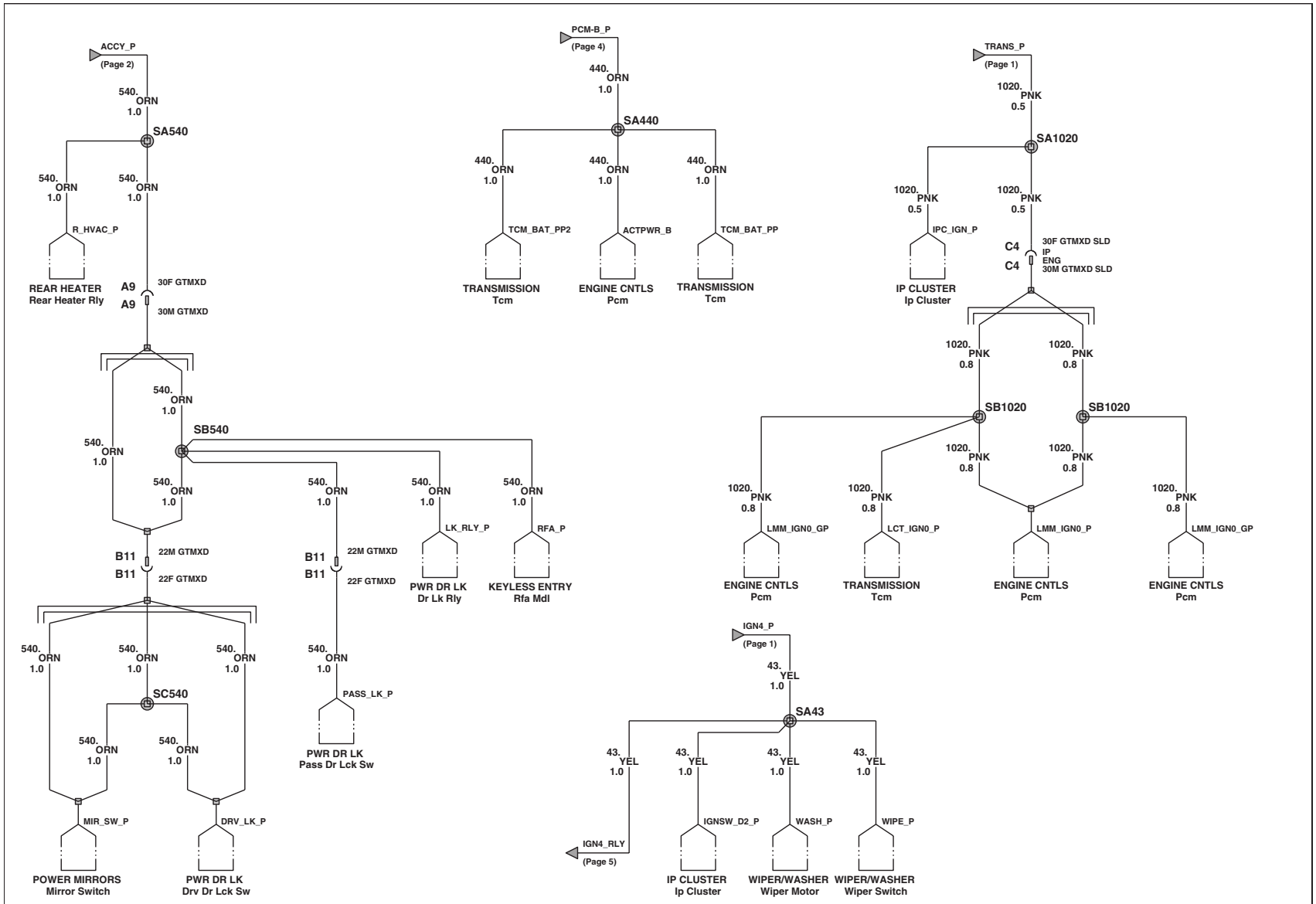


Power Distribution - (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



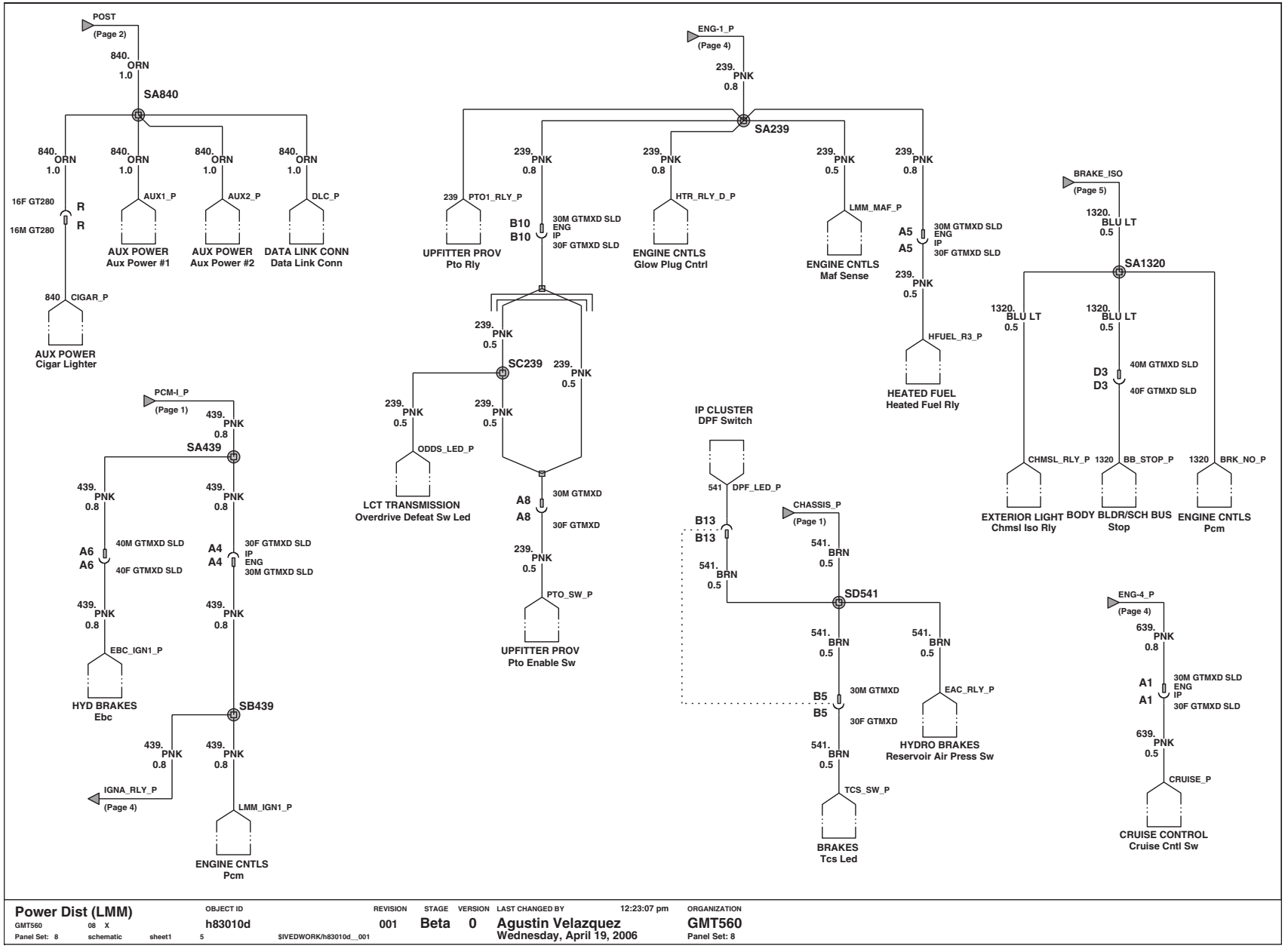
Power Dist (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83010d	001	Beta	0	Agustin Velazquez	12:23:07 pm	GMT560
Panel Set: 6 schematic sheet1 5	$IVEDWORK/h83010d__001				Wednesday, April 19, 2006		Panel Set: 6

Power Distribution - (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



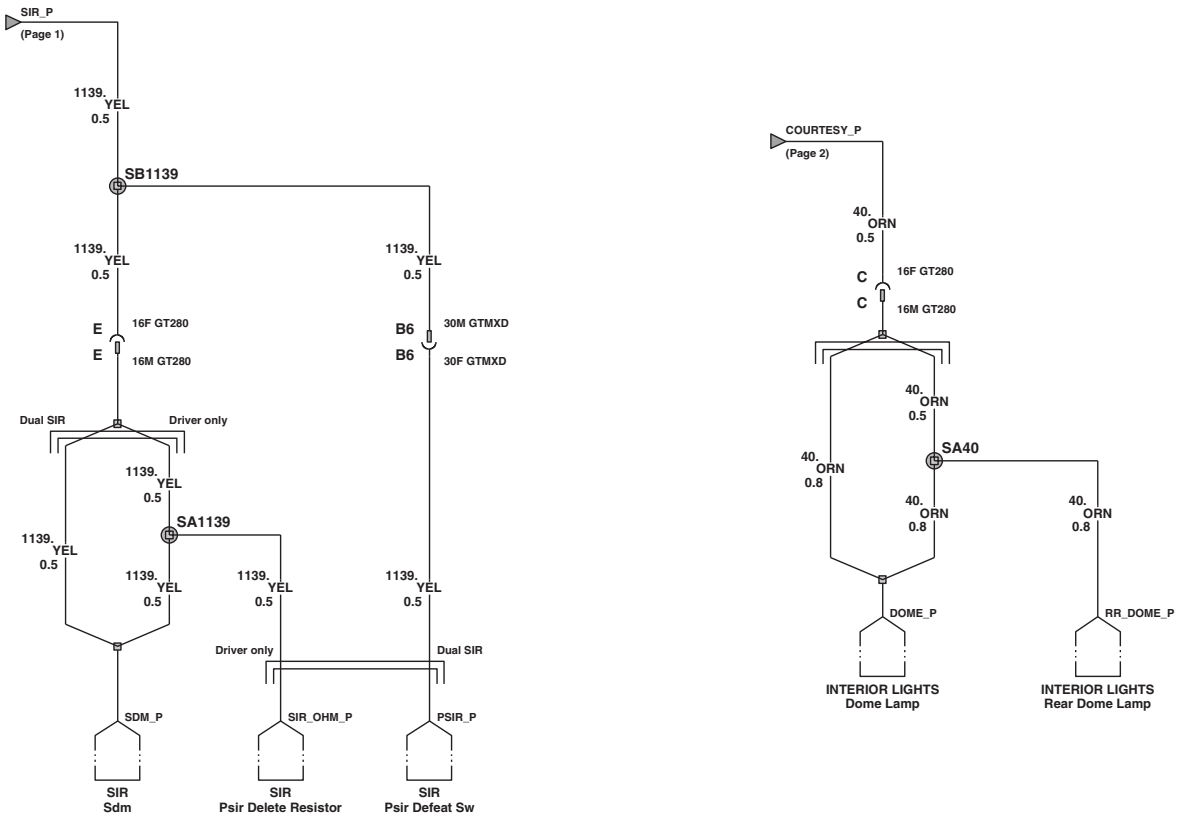
Power Dist (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83010d	001	Beta	0	Agustin Velazquez	12:23:07 pm	GMT560
Panel Set: 7 schematic sheet1 5	$IVEDWORK/h83010d__001				Wednesday, April 19, 2006		Panel Set: 7

Power Distribution - (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



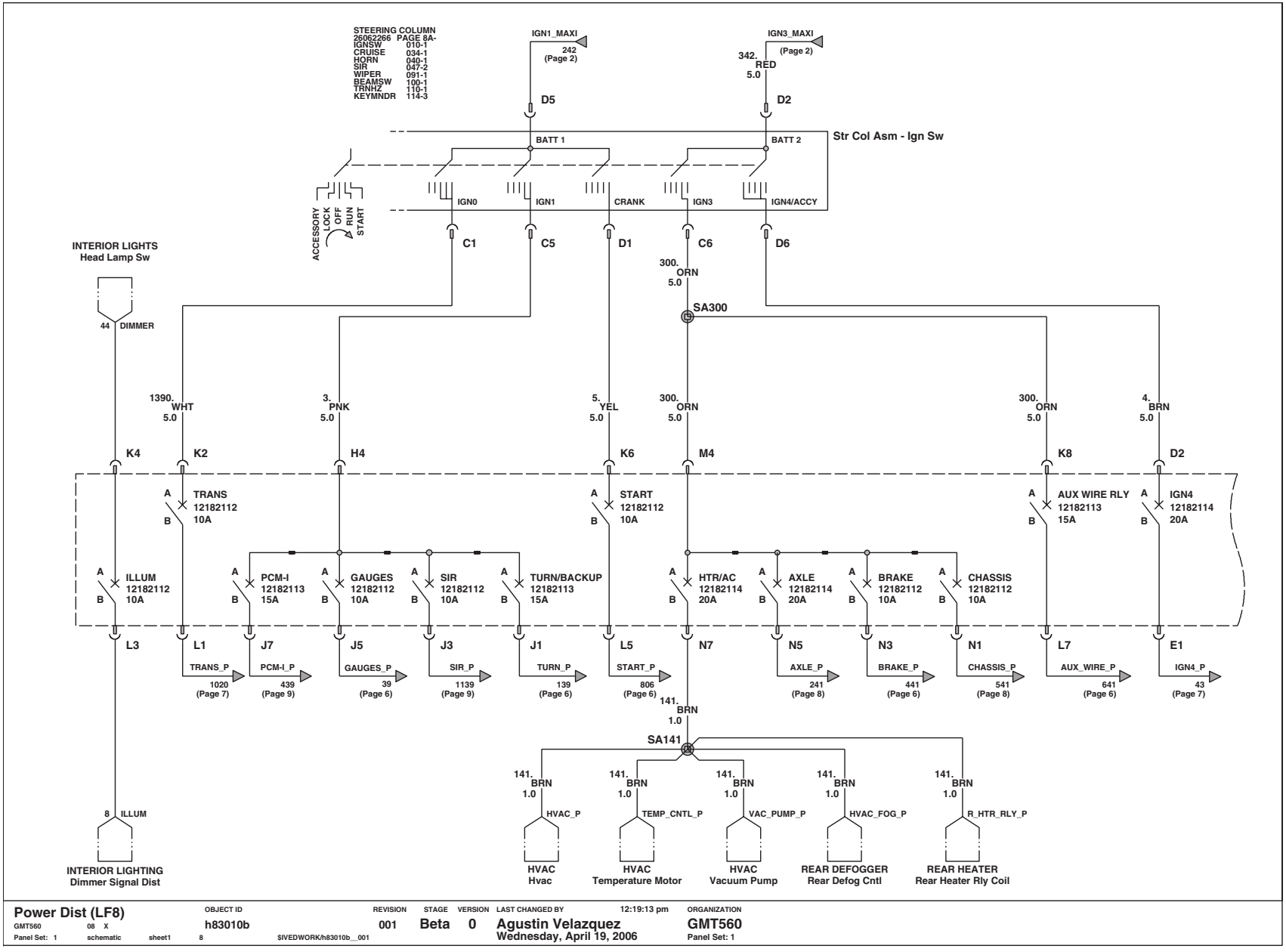
Power Dist (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83010d	001	Beta	0	Agustin Velazquez	12:23:07 pm	GMT560
Panel Set: 8 schematic sheet1 5	$IVEDWORK/h83010d__001				Wednesday, April 19, 2006		Panel Set: 8

Power Distribution - (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)

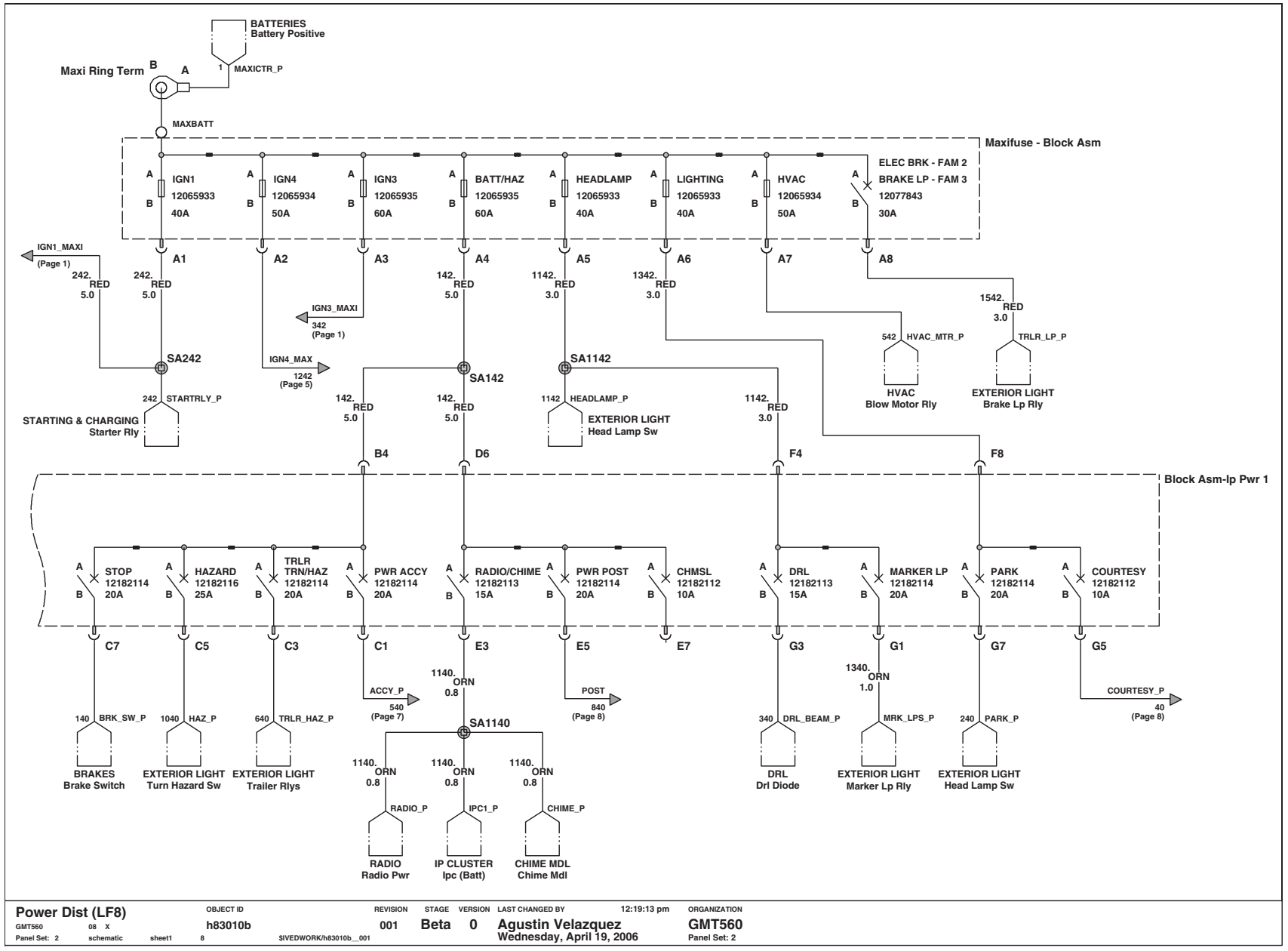


Power Dist (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:23:07 pm	ORGANIZATION
GMT560 08 X	h83010d	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 9 schematic sheet1 5	$IVEDWORK/h83010d__001				Wednesday, April 19, 2006		Panel Set: 9

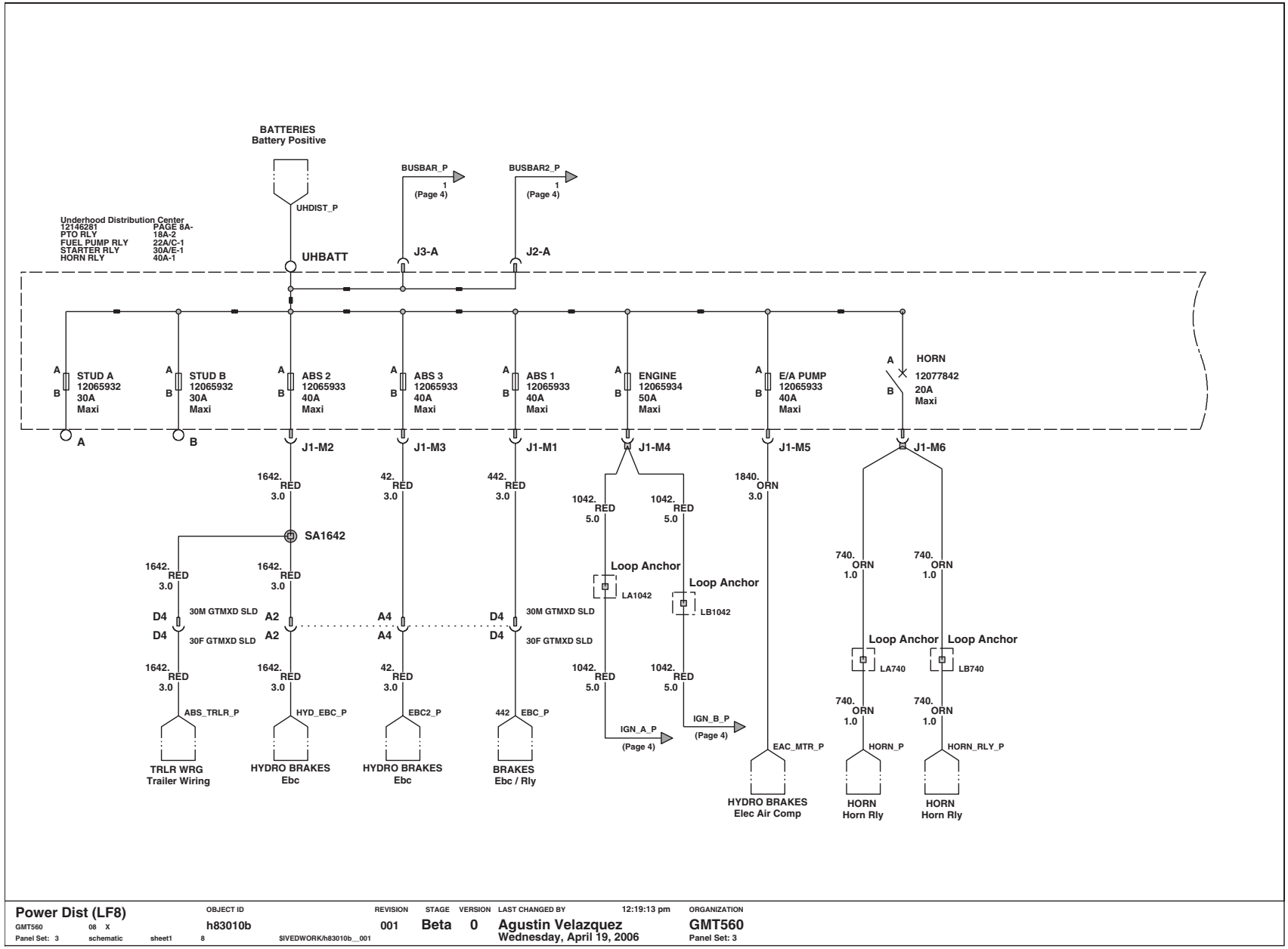
Power Distribution - (LF8) 7.8L L6 Isuzu 6H - Diesel



Power Distribution - (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)

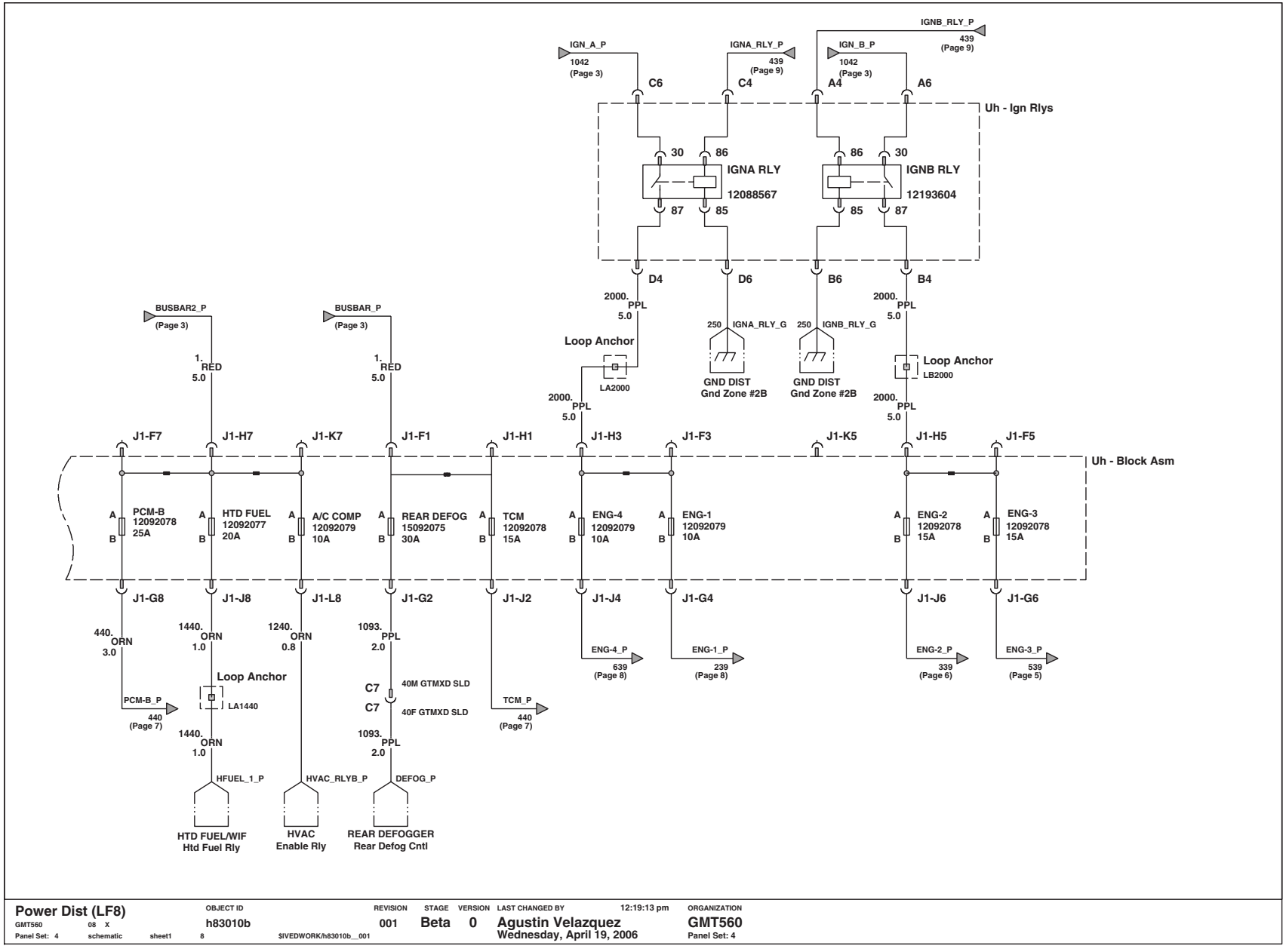


Power Distribution - (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



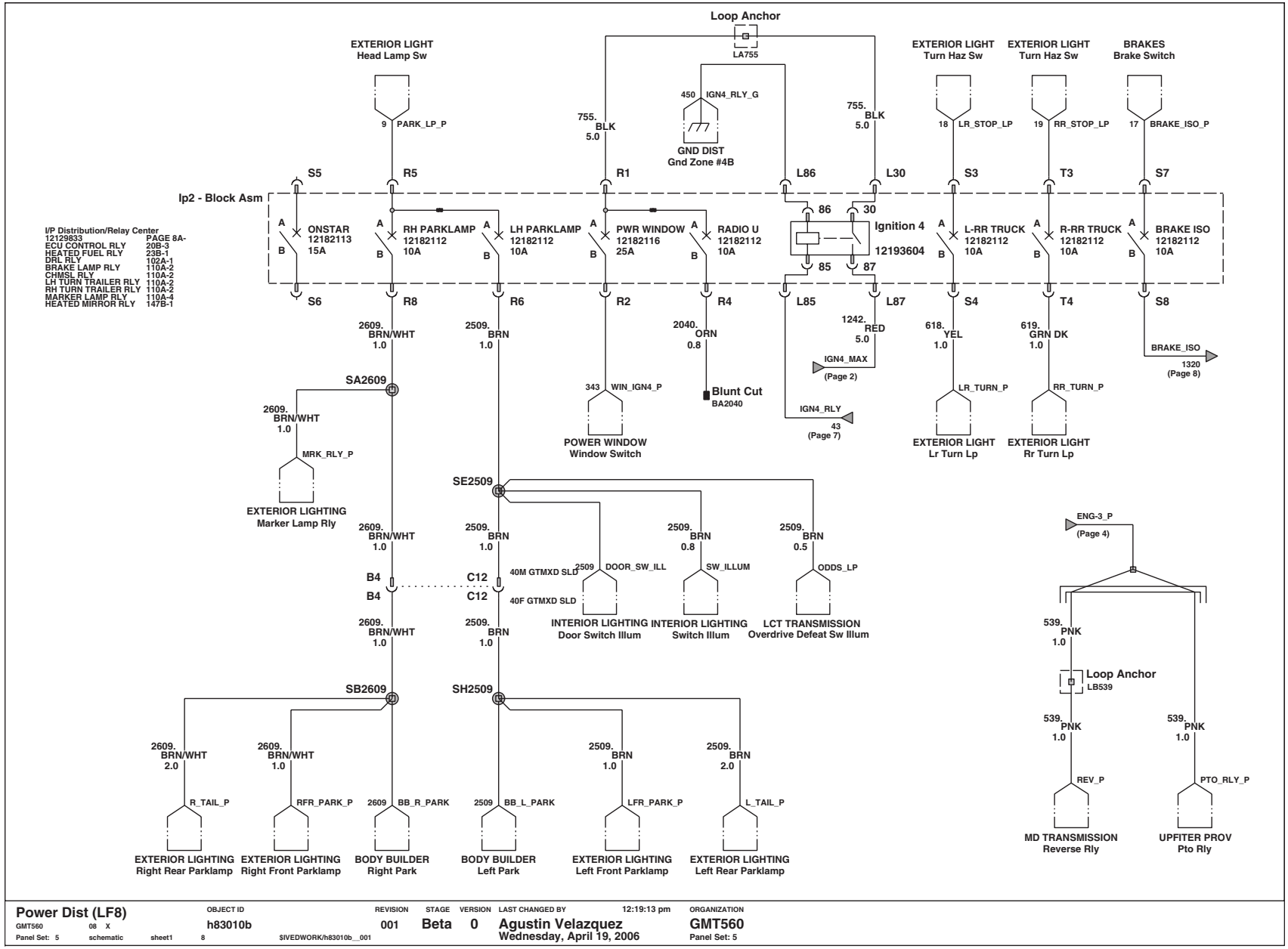
Power Dist (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:19:13 pm	ORGANIZATION
GMT560 08 X	h83010b	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 3 schematic sheet1 8	$IVEDWORK/h83010b__001				Wednesday, April 19, 2006		Panel Set: 3

Power Distribution - (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



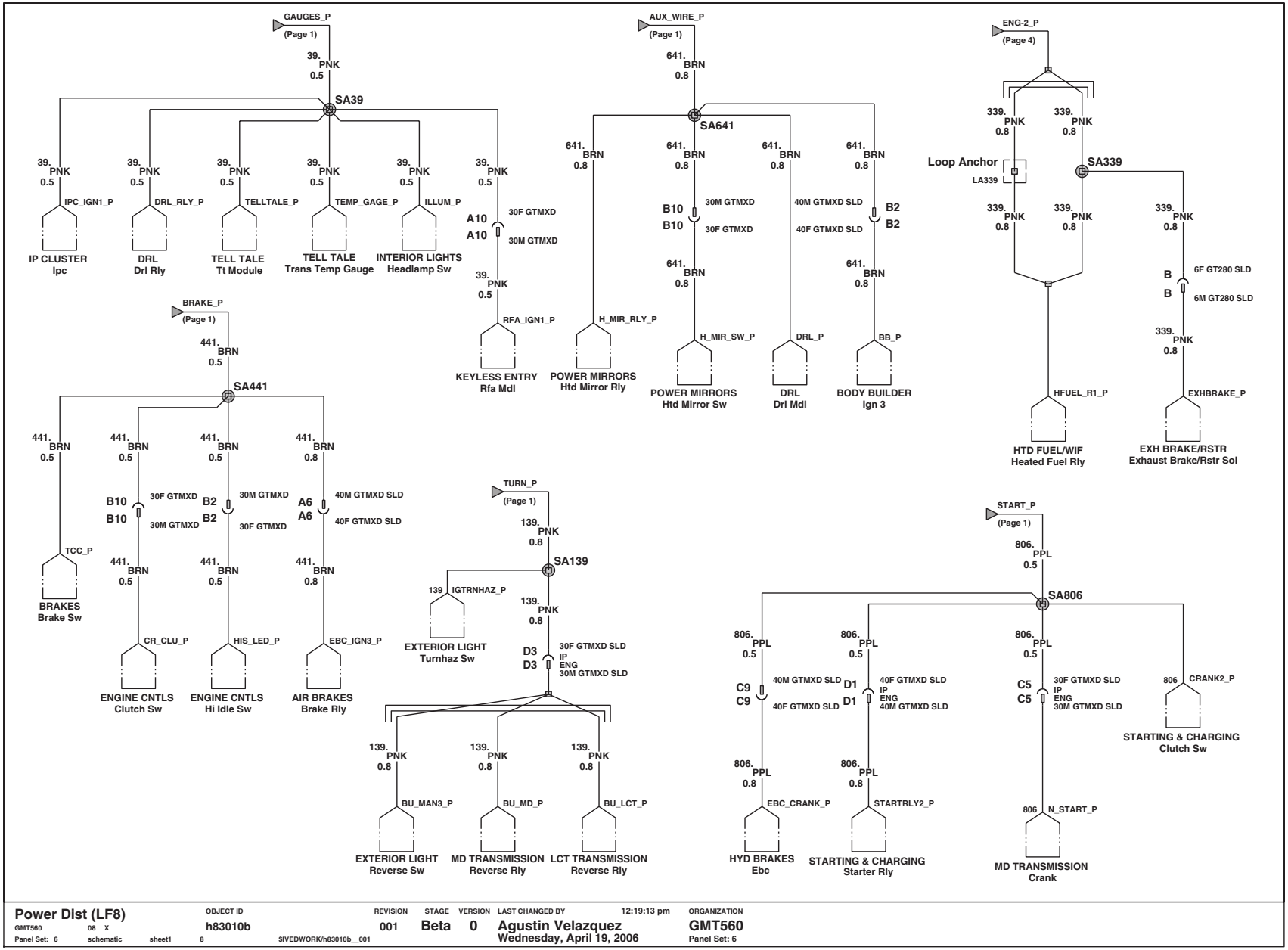
Power Dist (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83010b	001	Beta	0	Agustin Velazquez	12:19:13 pm	GMT560
Panel Set: 4 schematic sheet1 8	$IVEDWORK/h83010b__001				Wednesday, April 19, 2006		Panel Set: 4

Power Distribution - (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)

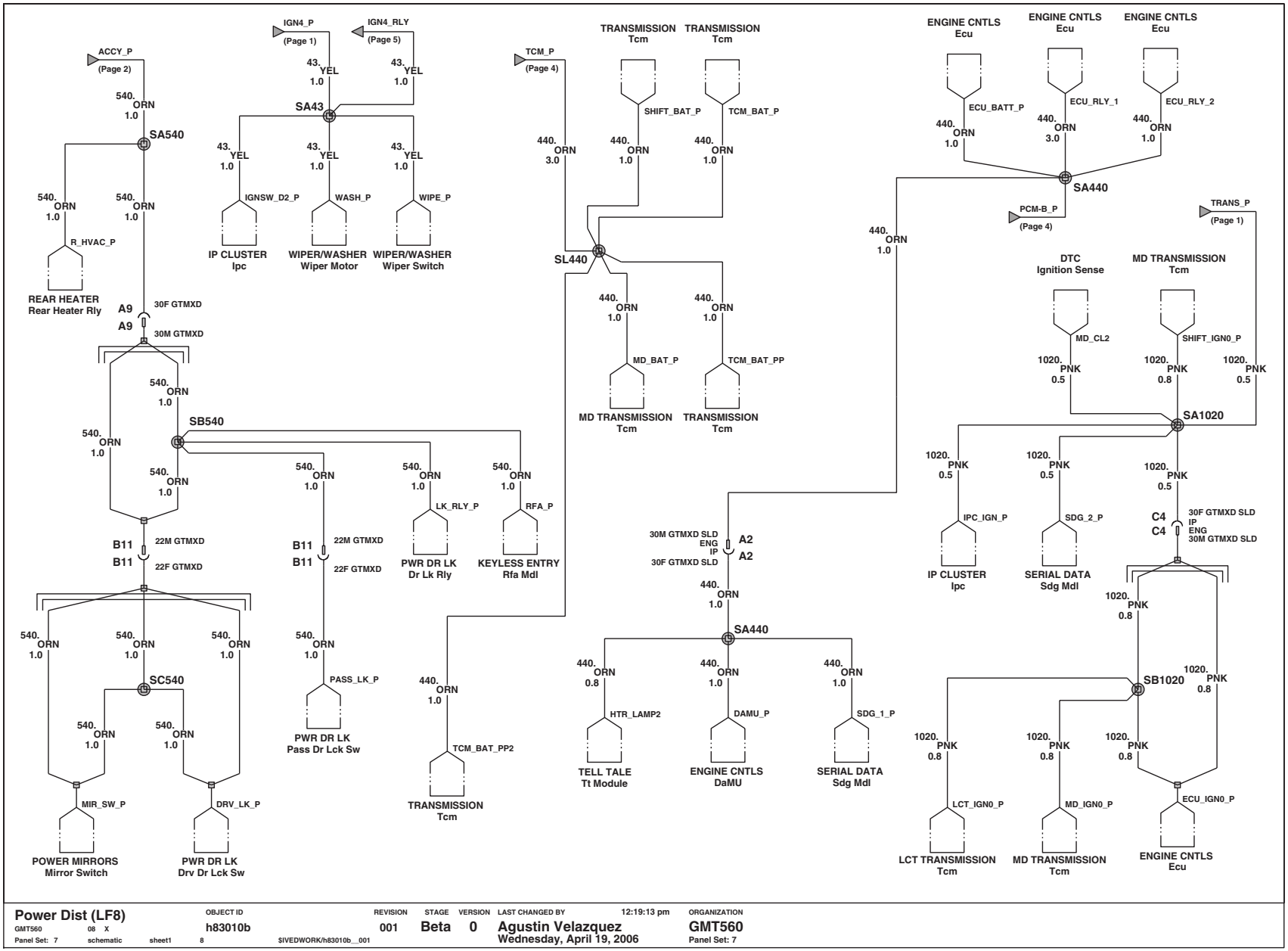


Power Dist (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83010b	001	Beta	0	Agustin Velazquez	12:19:13 pm	GMT560
Panel Set: 5 schematic sheet1 8	$IVEDWORK/h83010b__001				Wednesday, April 19, 2006		Panel Set: 5

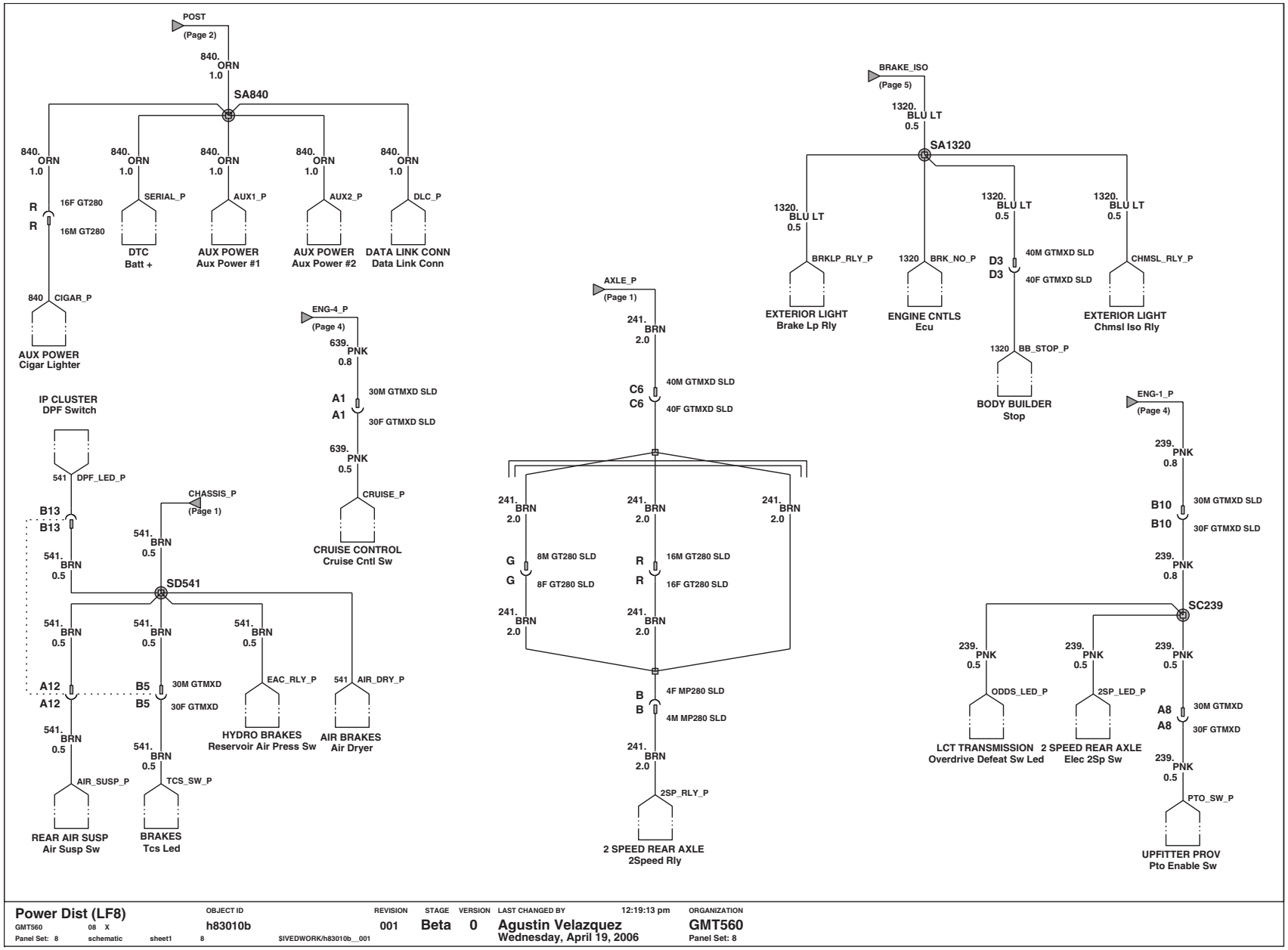
Power Distribution - (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



Power Distribution - (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)

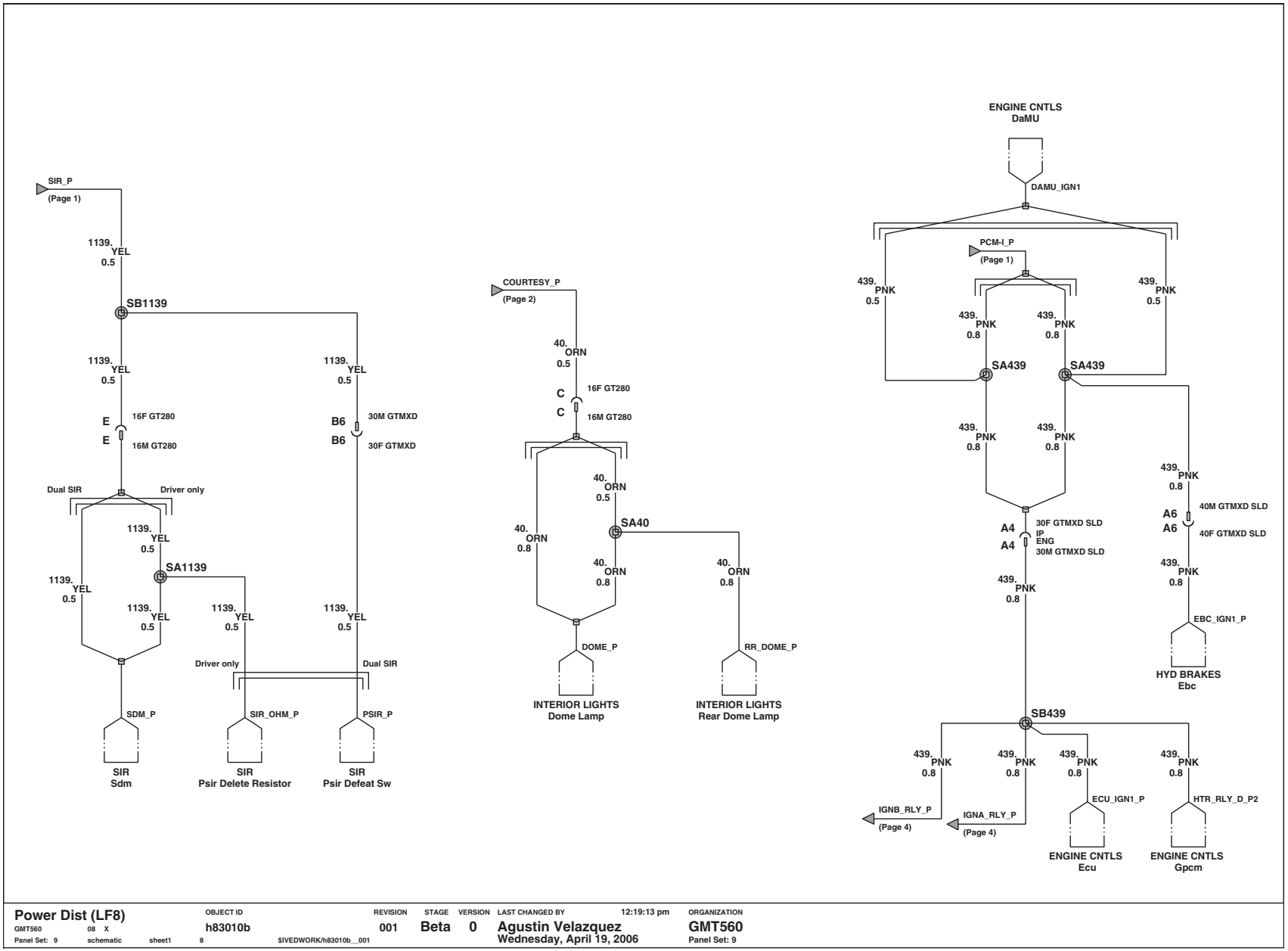


Power Distribution - (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



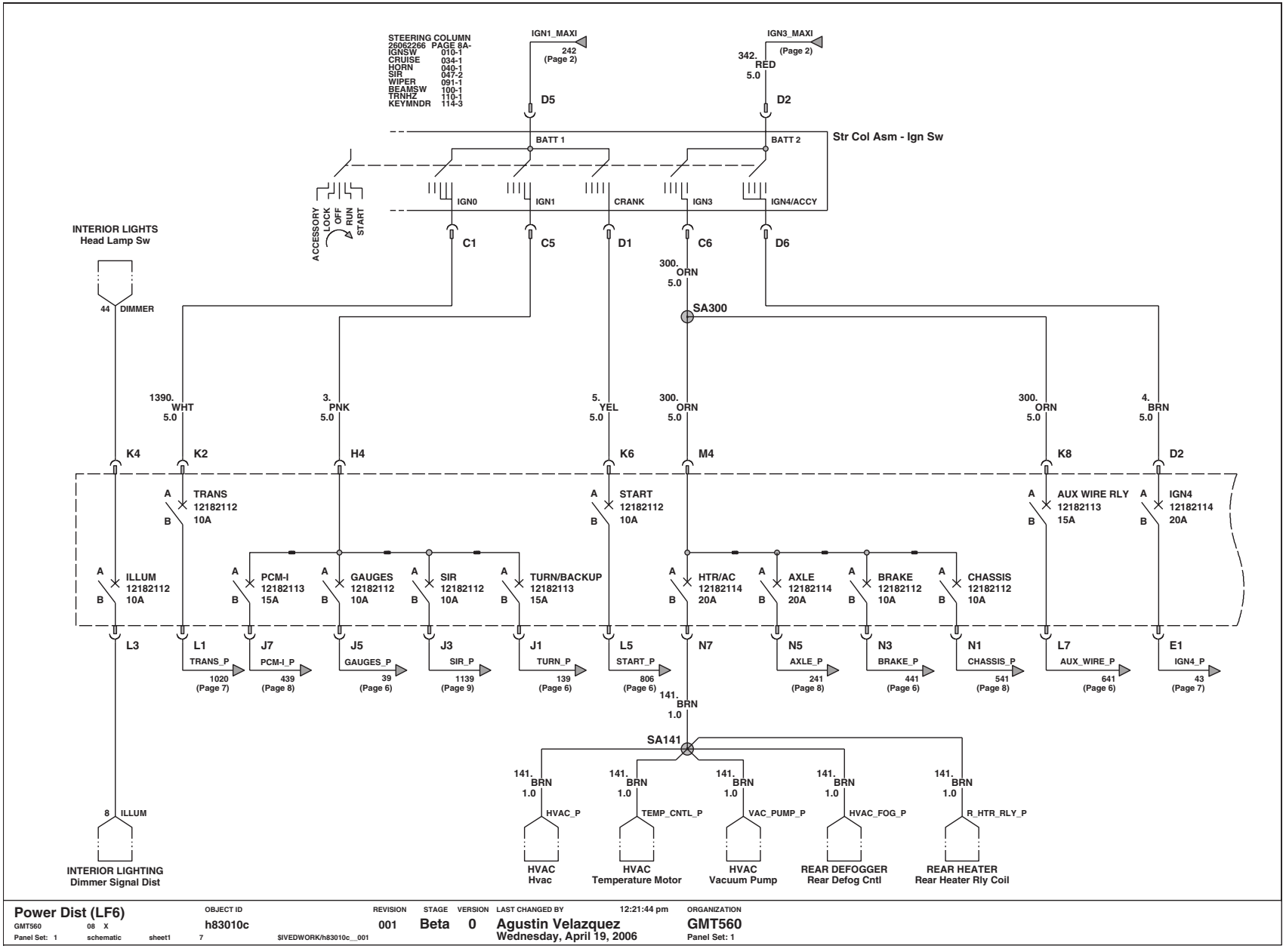
Power Dist (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:19:13 pm	ORGANIZATION
GMT560 08 X	h83010b	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 8 schematic sheet1 8	$IVEDWORK/h83010b__001				Wednesday, April 19, 2006		Panel Set: 8

Power Distribution - (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)

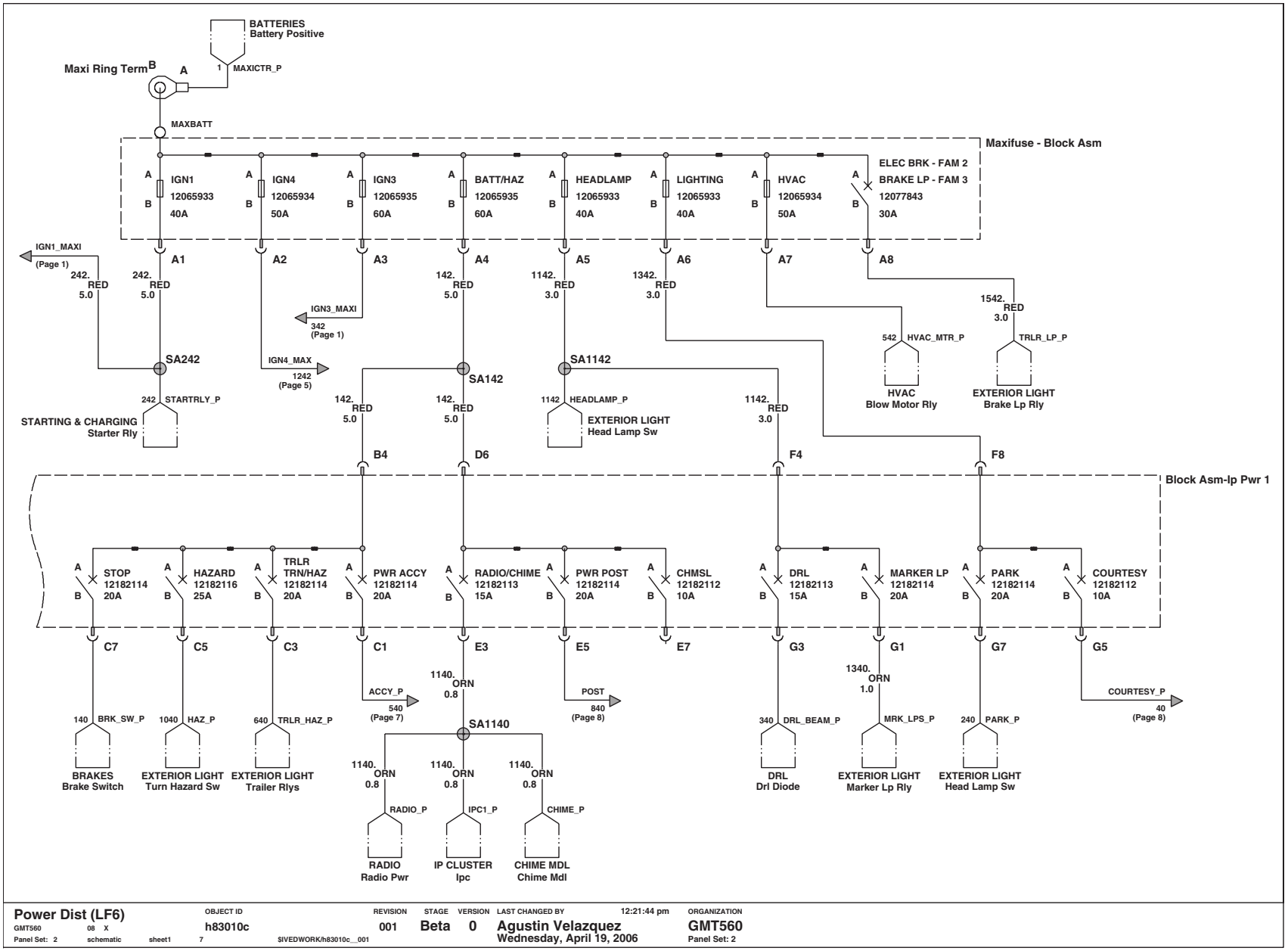


Power Dist (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:19:13 pm	ORGANIZATION
GMT560 08 X	h83010b	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 9 schematic sheet1 8	$IVEDWORK/h83010b__001				Wednesday, April 19, 2006		Panel Set: 9

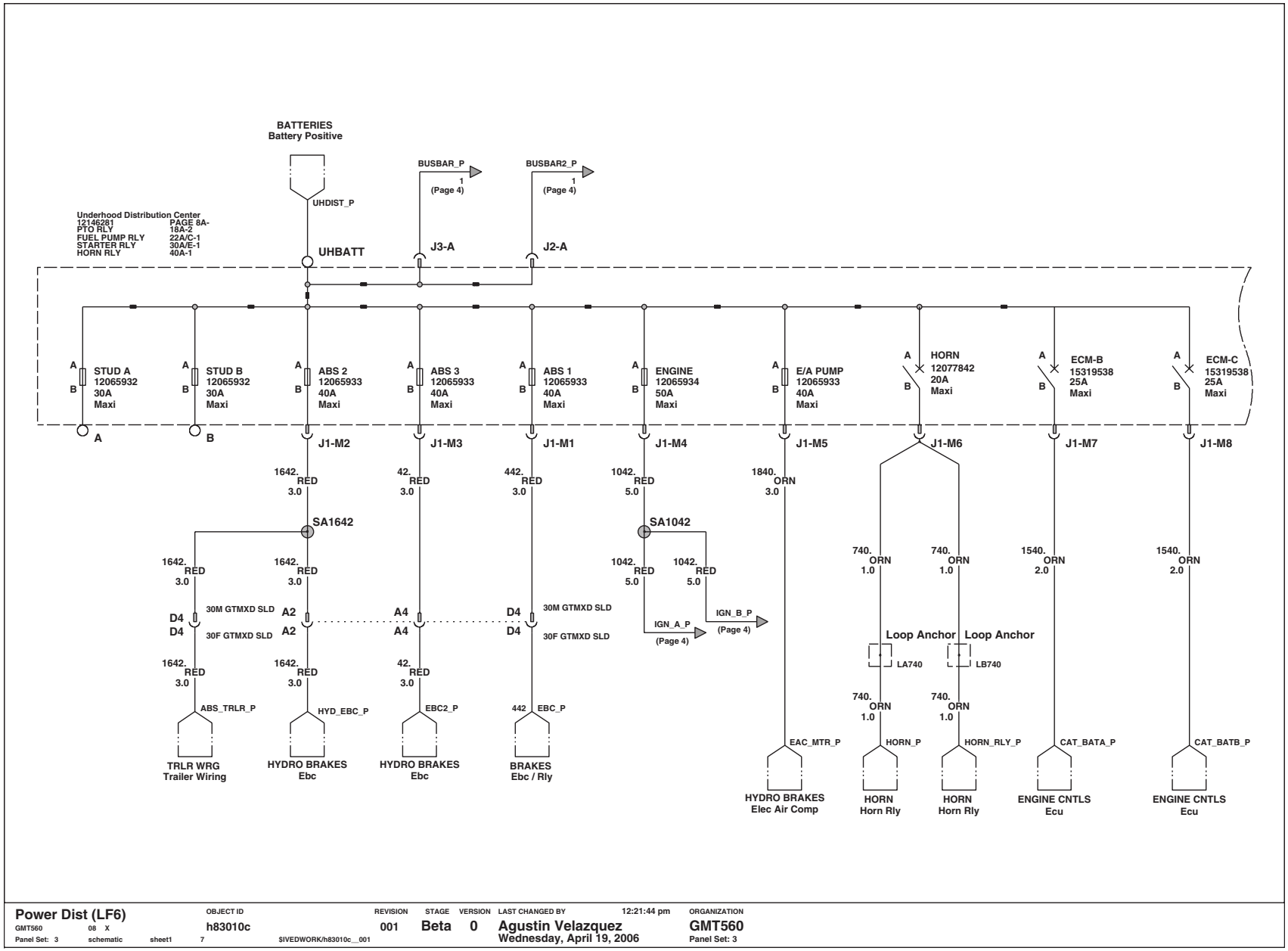
Power Distribution - (LF6) 7.2L L6 Caterpillar® C7 - Diesel



Power Distribution - (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)

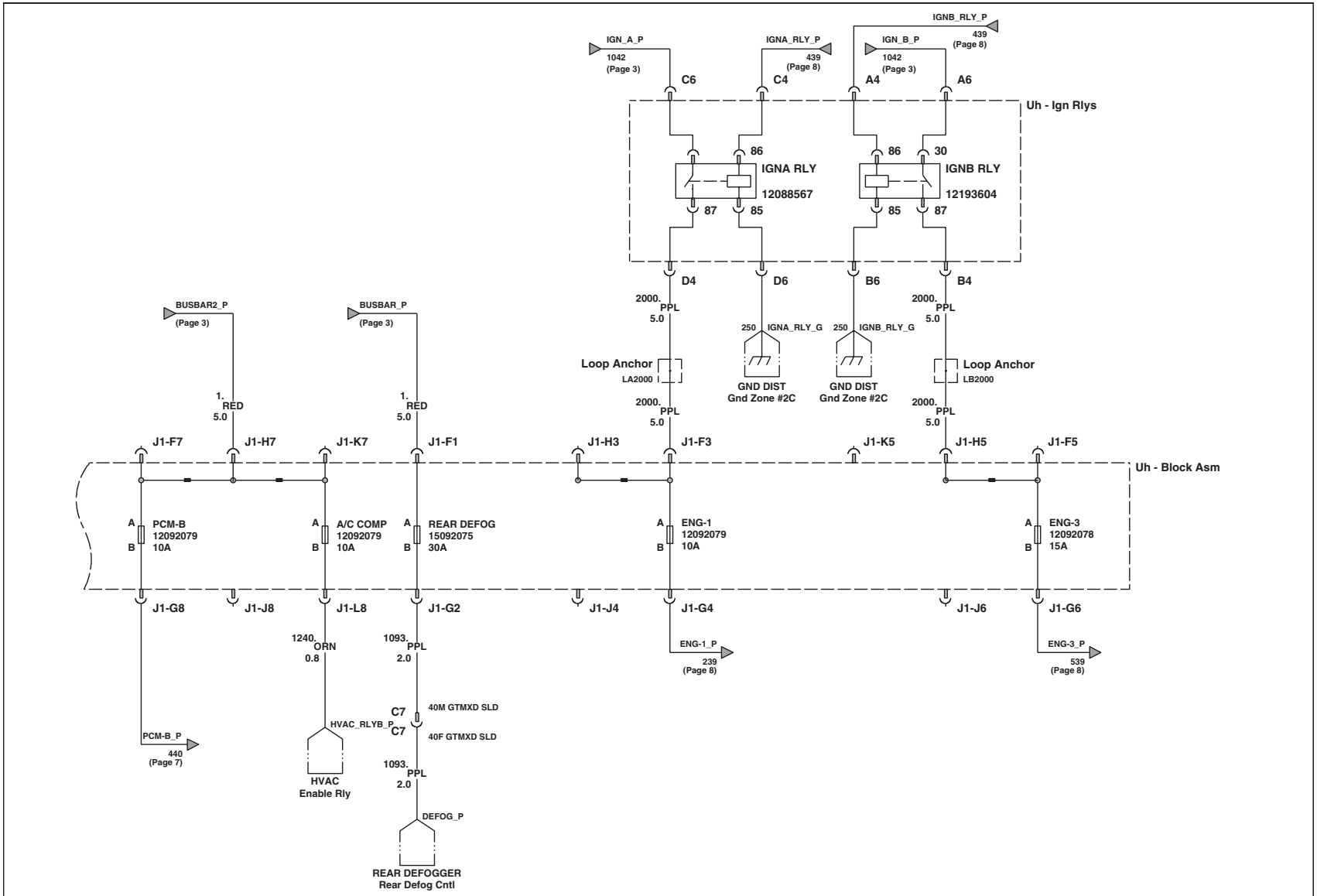


Power Distribution - (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



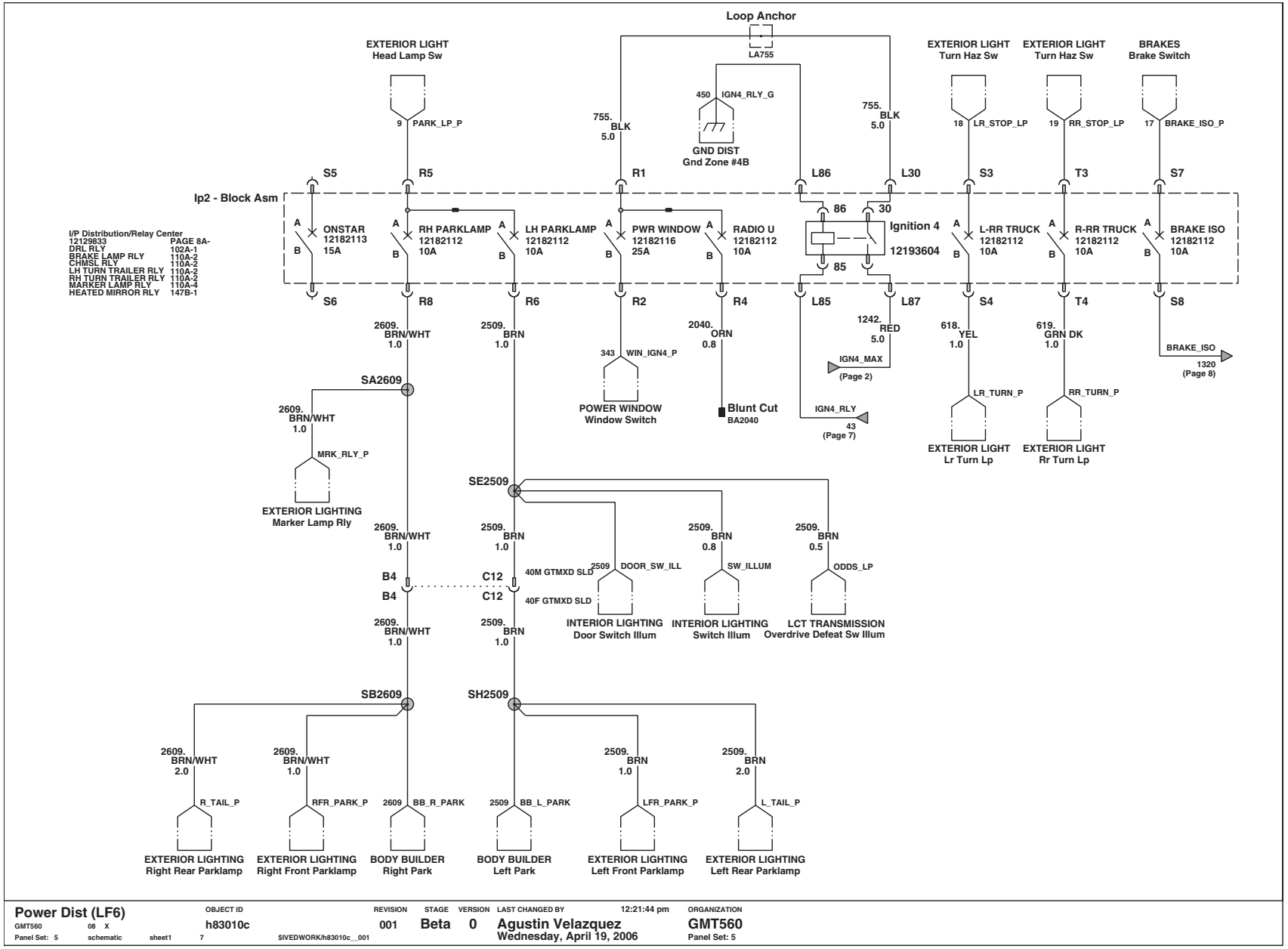
Power Dist (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:21:44 pm	ORGANIZATION
GMT560 08 X	h83010c	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 3 schematic sheet1 7	$IVEDWORK/h83010c__001				Wednesday, April 19, 2006		Panel Set: 3

Power Distribution - (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)

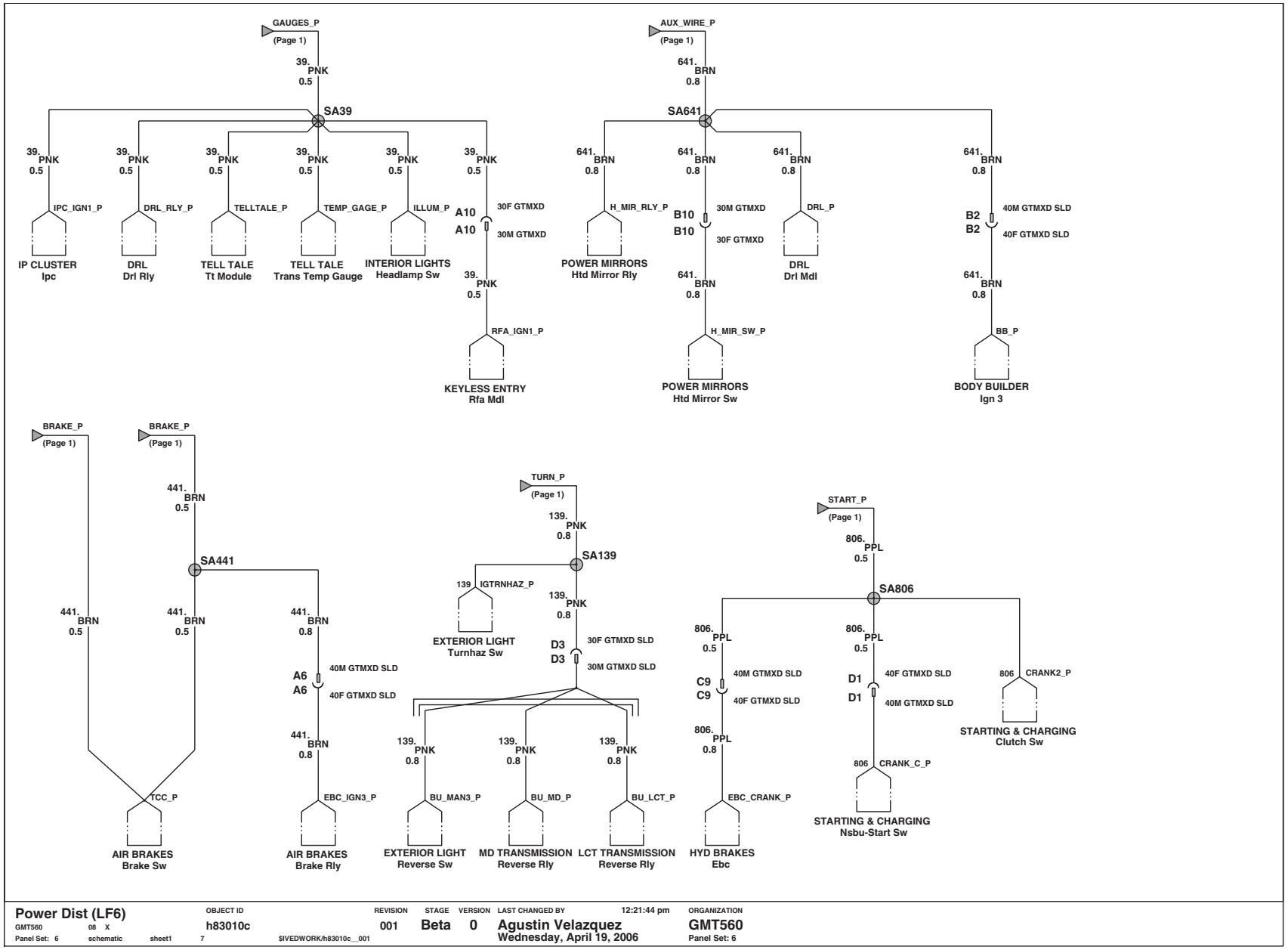


Power Dist (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83010c	001	Beta	0	Agustin Velazquez	12:21:44 pm	GMT560
Panel Set: 4 schematic sheet1 7	$IVEDWORK/h83010c__001				Wednesday, April 19, 2006		Panel Set: 4

Power Distribution - (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)

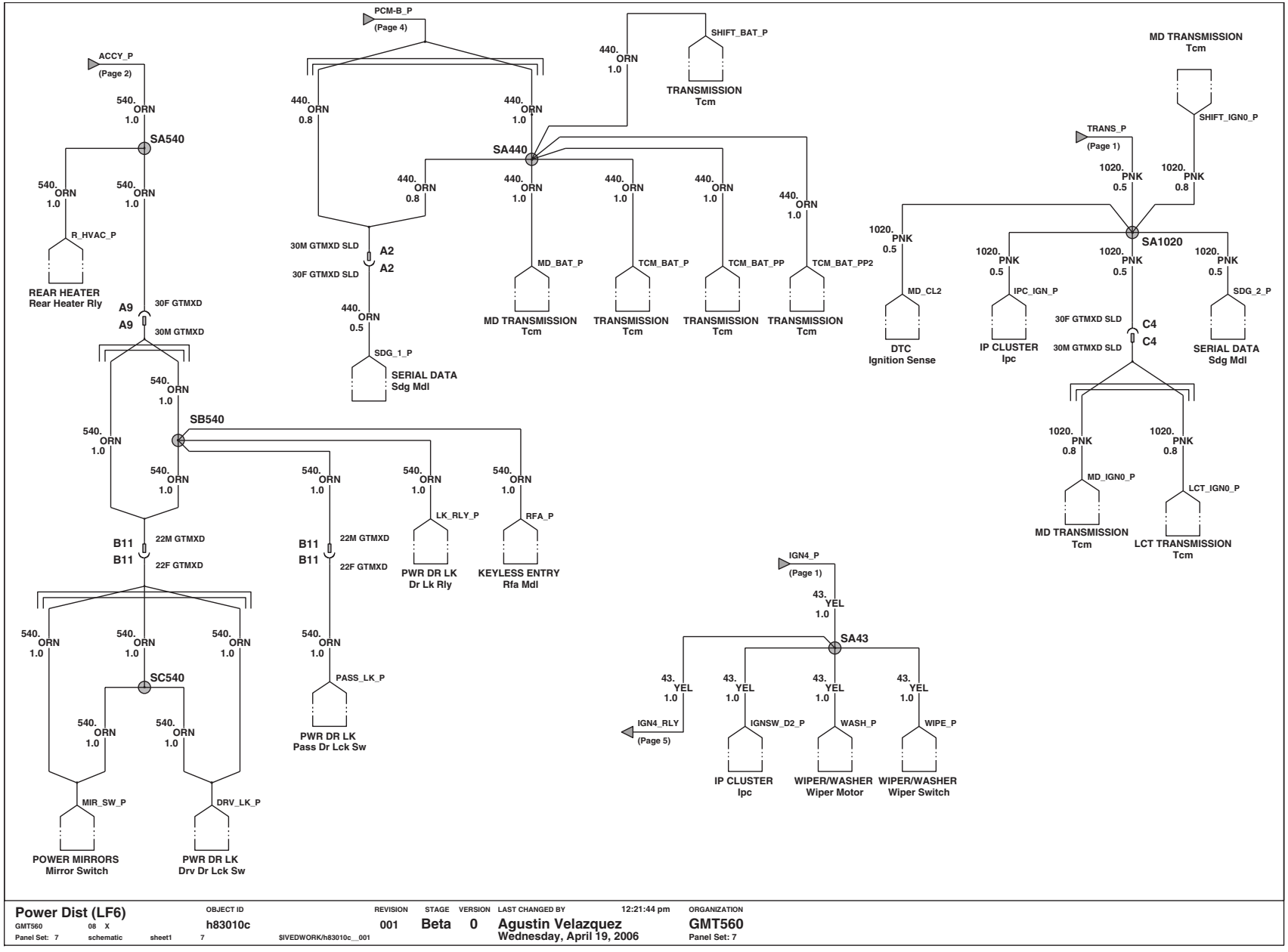


Power Distribution - (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)

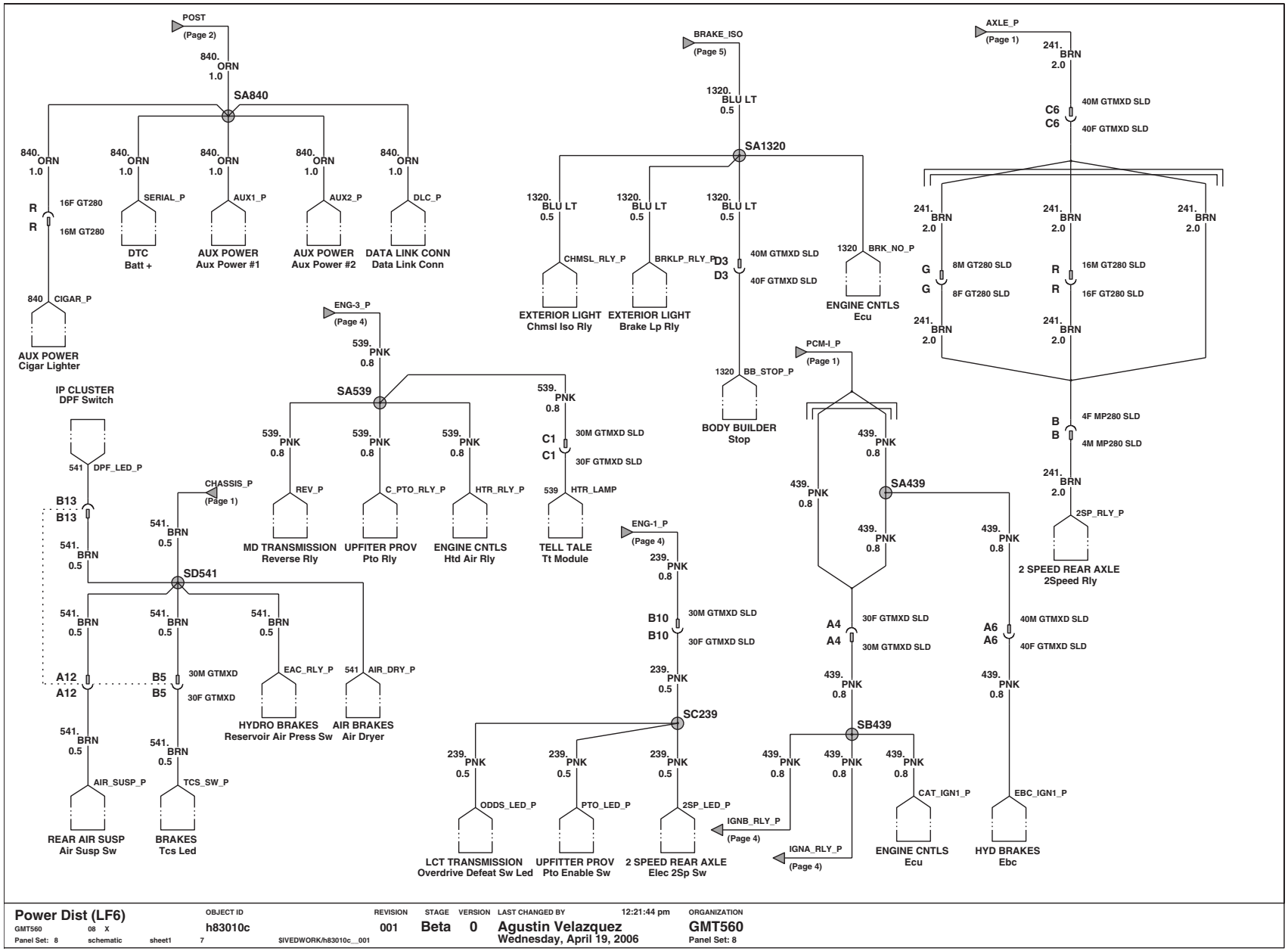


Power Dist (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:21:44 pm	ORGANIZATION
GMT560 08 X	h83010c	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 6 schematic sheet1 7	$IVEDWORK/h83010c__001				Wednesday, April 19, 2006		Panel Set: 6

Power Distribution - (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)

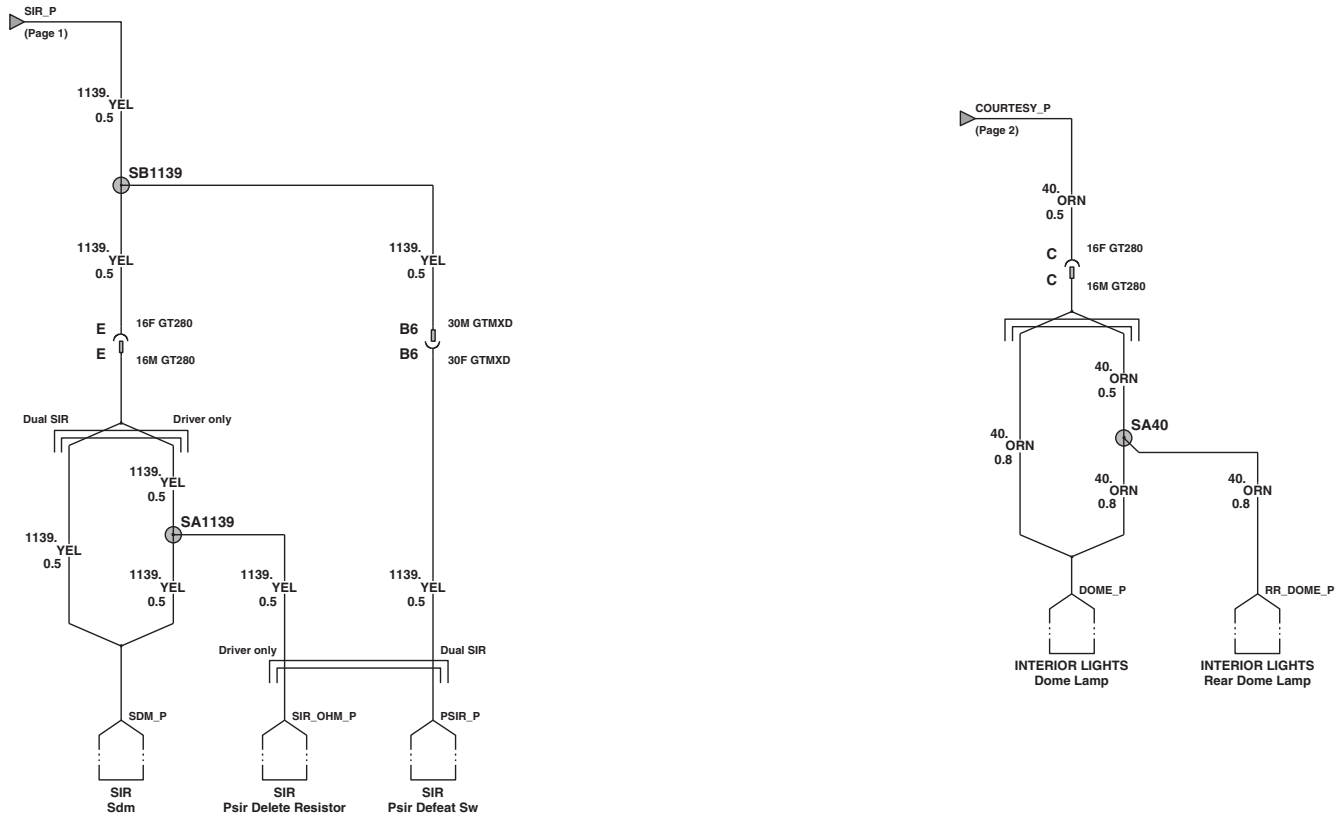


Power Distribution - (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



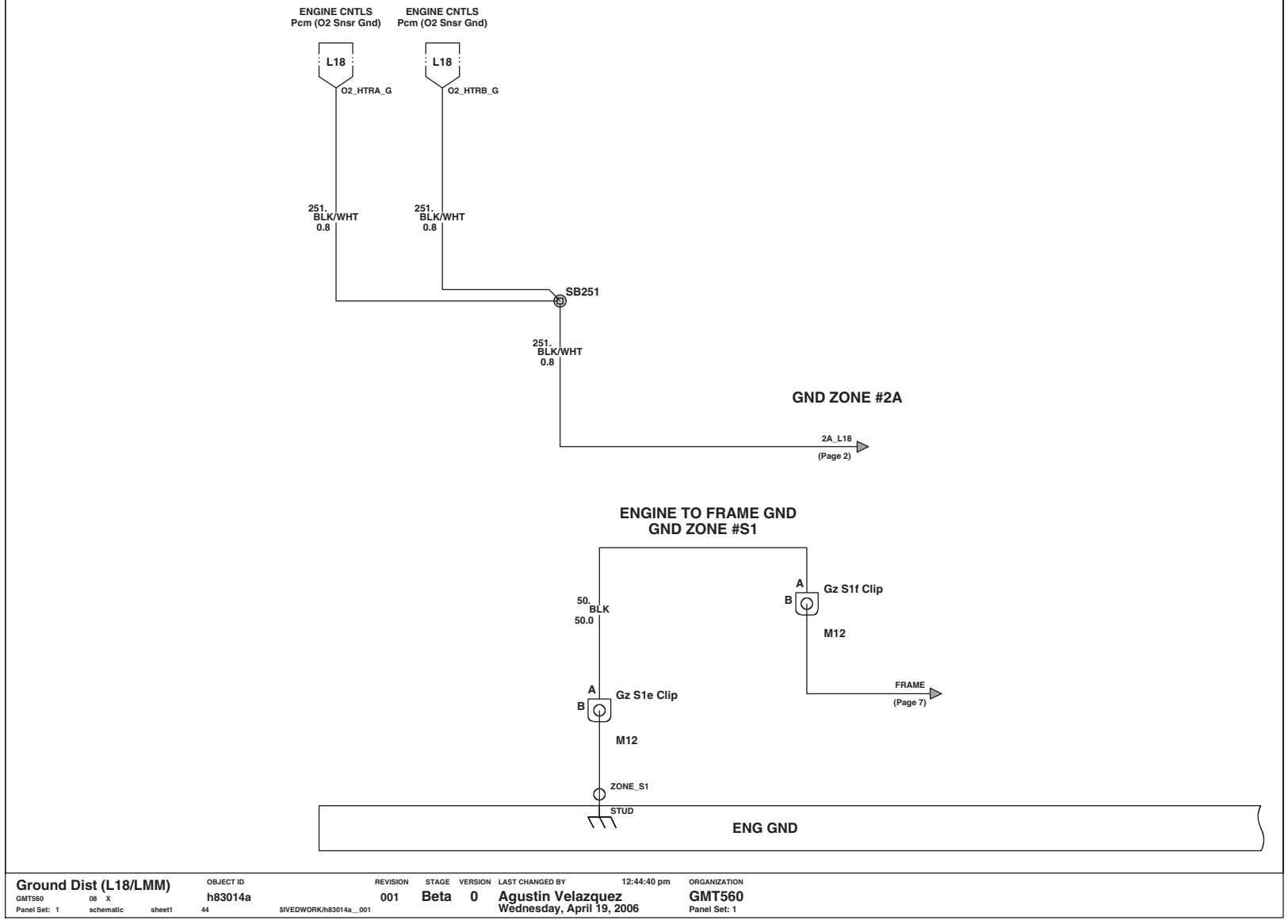
Power Dist (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83010c	001	Beta	0	Agustin Velazquez	12:21:44 pm	GMT560
Panel Set: 8 schematic sheet1 7	$IVEDWORK/h83010c__001				Wednesday, April 19, 2006		Panel Set: 8

Power Distribution - (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



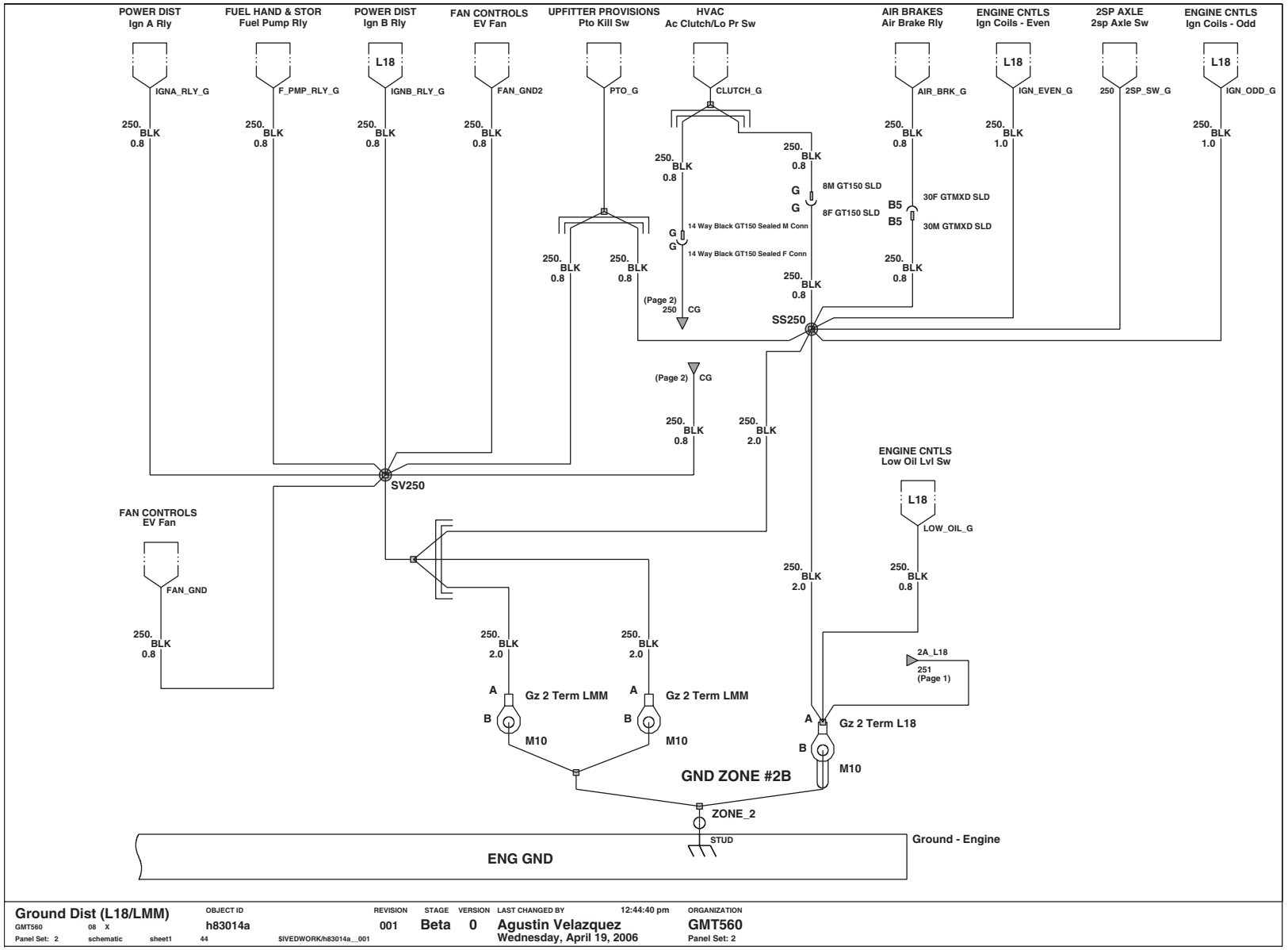
Power Dist (LF6)	OBJECT ID		REVISION	STAGE	VERSION	LAST CHANGED BY	12:21:44 pm	ORGANIZATION
GMT560 08 X	**h83010c**		**001**	**Beta**	**0**	**Agustin Velazquez**		**GMT560**
Panel Set: 9 schematic sheet1 7	$IVEDWORK/h83010c__001					**Wednesday, April 19, 2006**		Panel Set: 9

Ground Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel

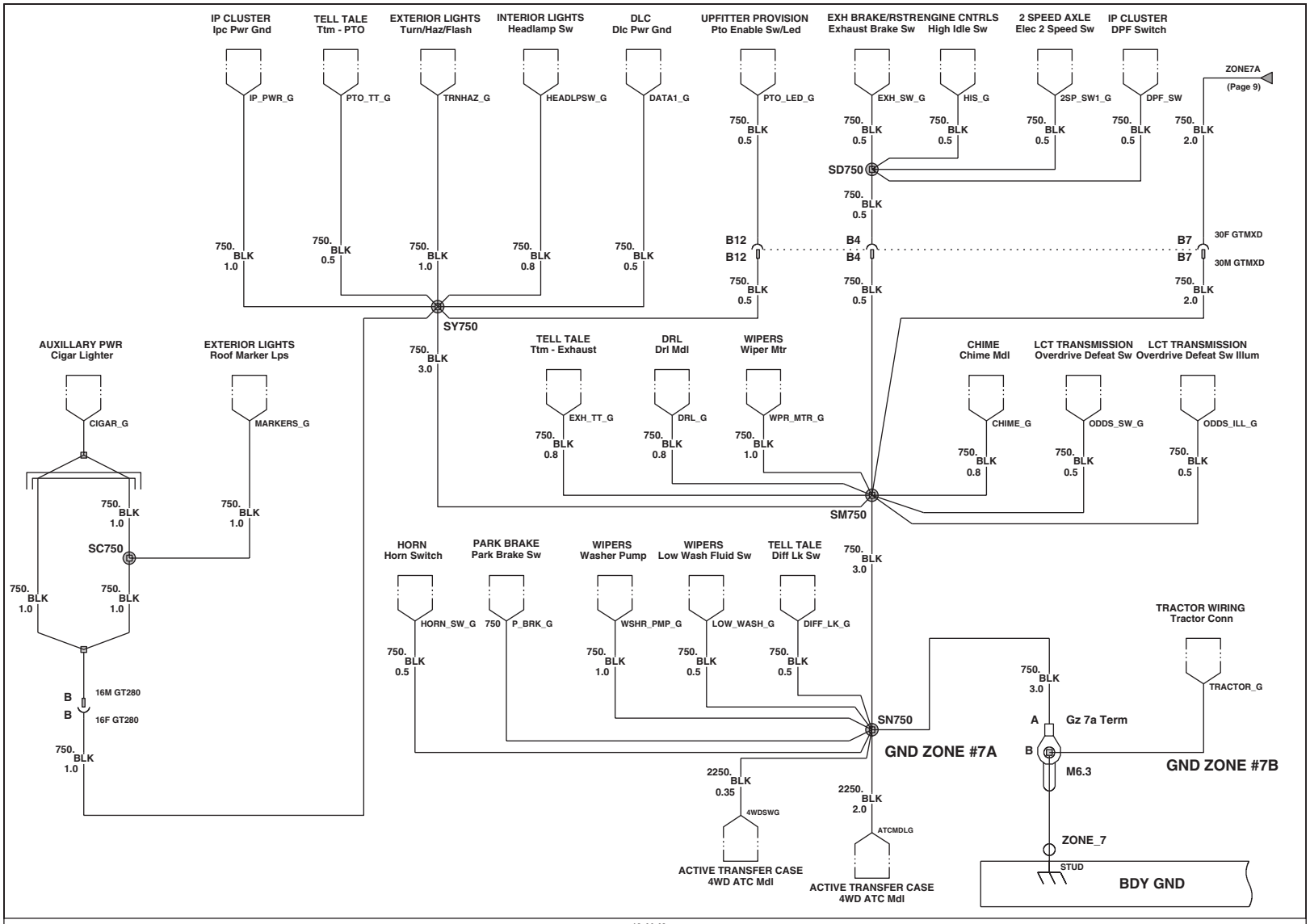


Ground Dist (L18/LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:44:40 pm	ORGANIZATION
GMT560 08 X	h83014a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 44	SIVEDWORK/h83014a__001				Wednesday, April 19, 2006		Panel Set: 1

Ground Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)

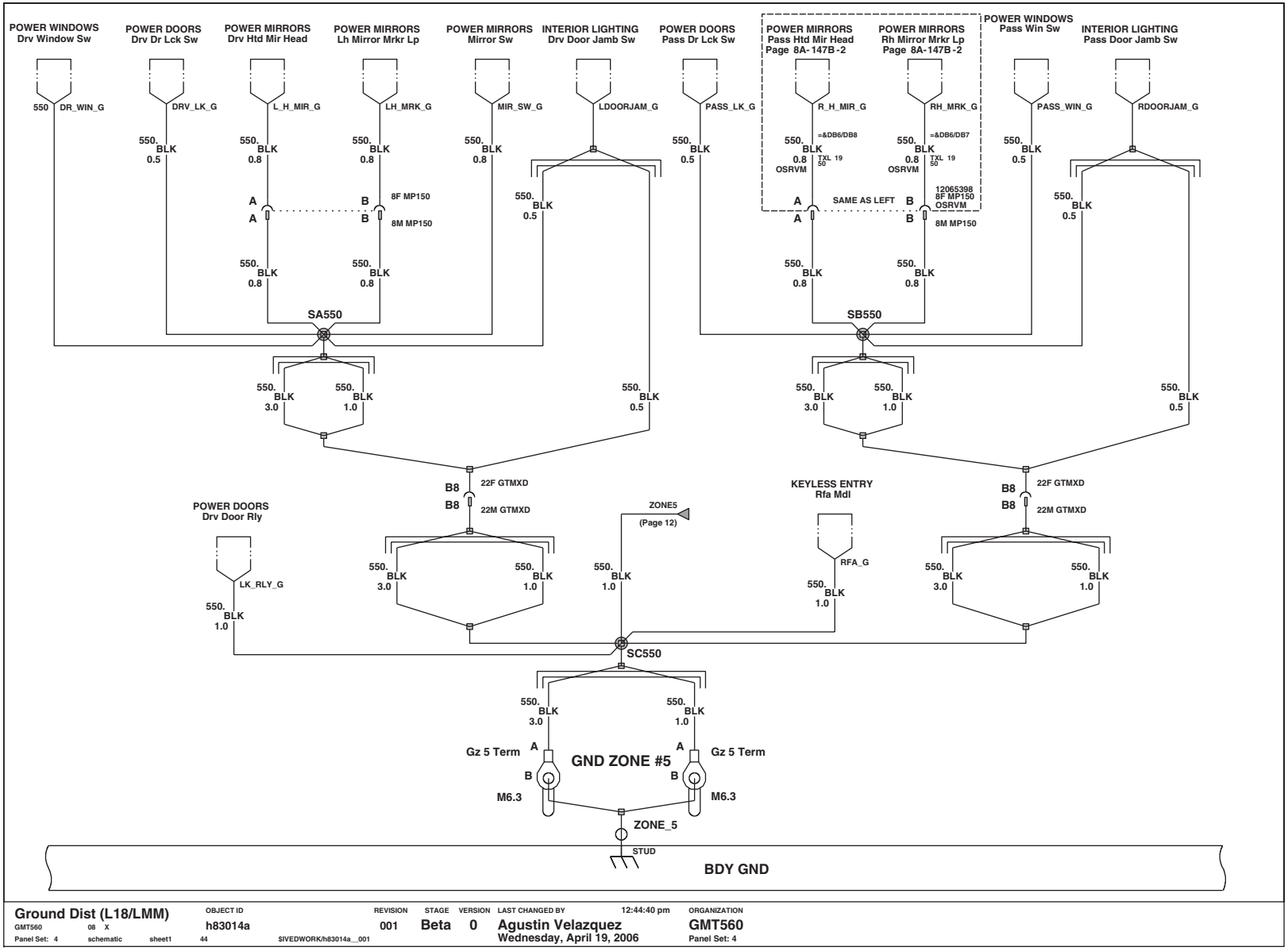


Ground Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



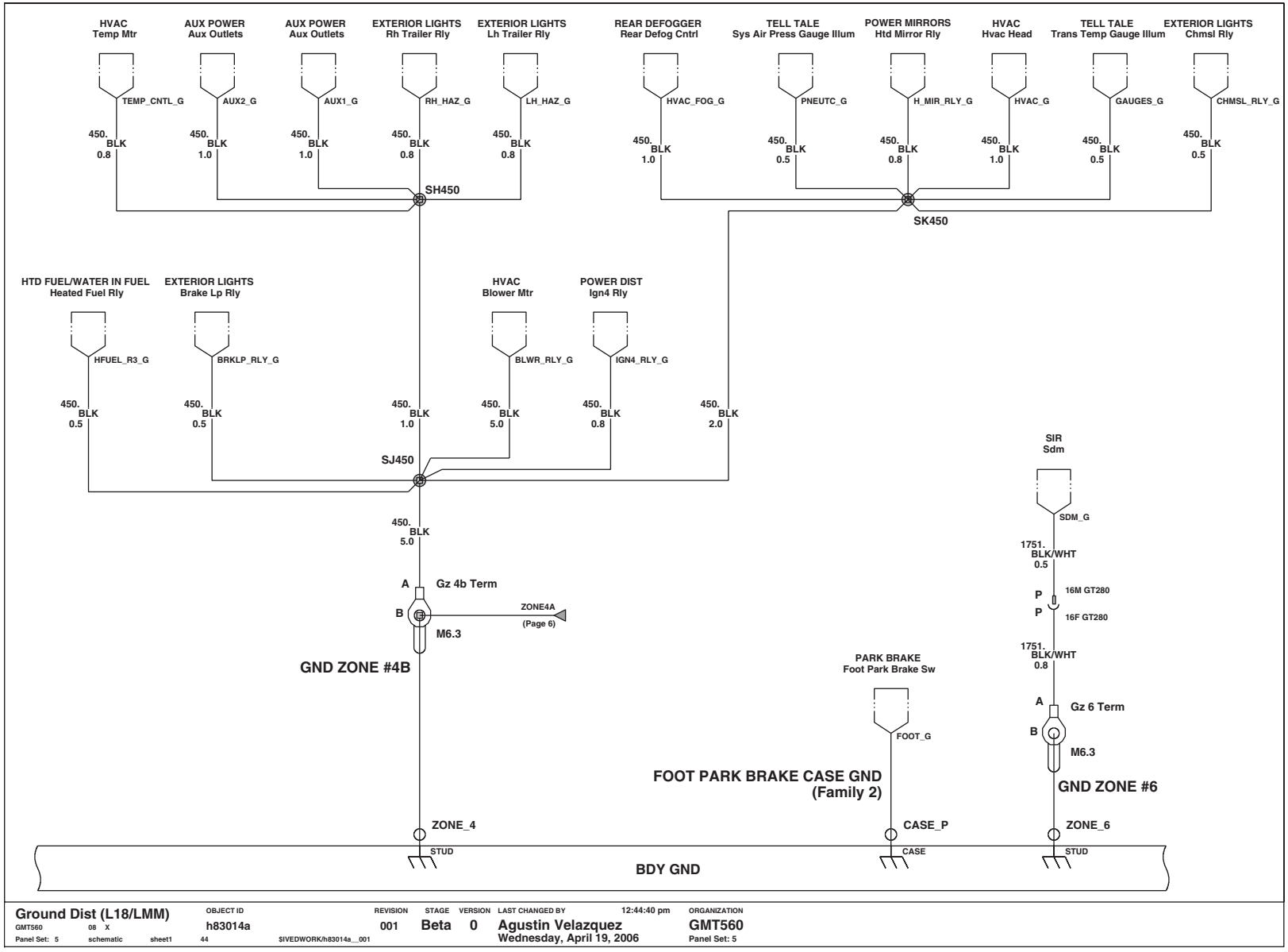
Ground Dist (L18/LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:44:40 pm	ORGANIZATION
GMT560 08 X	h83014a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 3 schematic sheet1 44	SIVEDWORK/h83014a__001				Wednesday, April 19, 2006		Panel Set: 3

Ground Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)

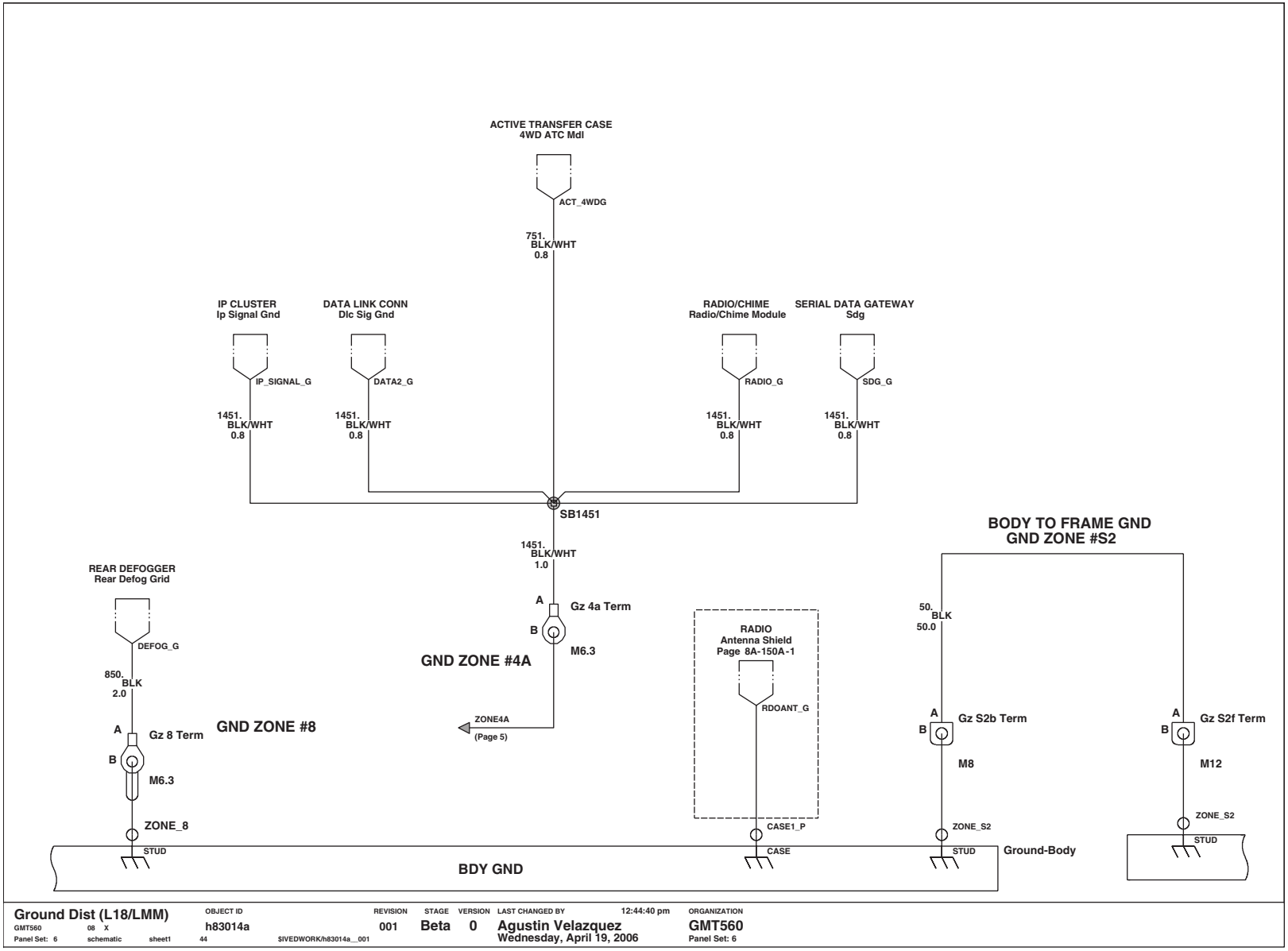


Ground Dist (L18/LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:44:40 pm	ORGANIZATION
GMT560 08 X	h83014a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 4 schematic sheet1 44 $IVEDWORK/h83014a__001					Wednesday, April 19, 2006		Panel Set: 4

Ground Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)

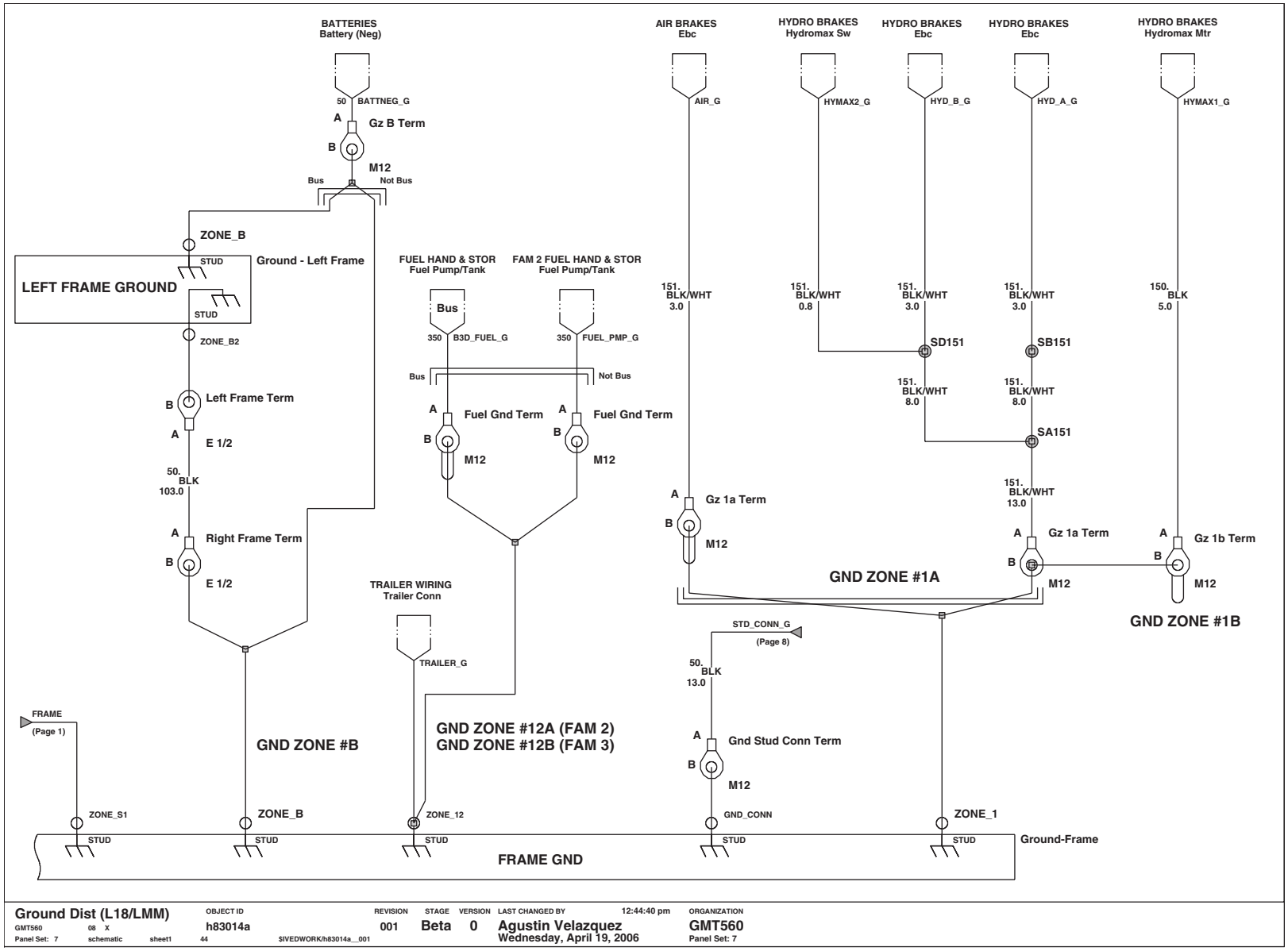


Ground Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)

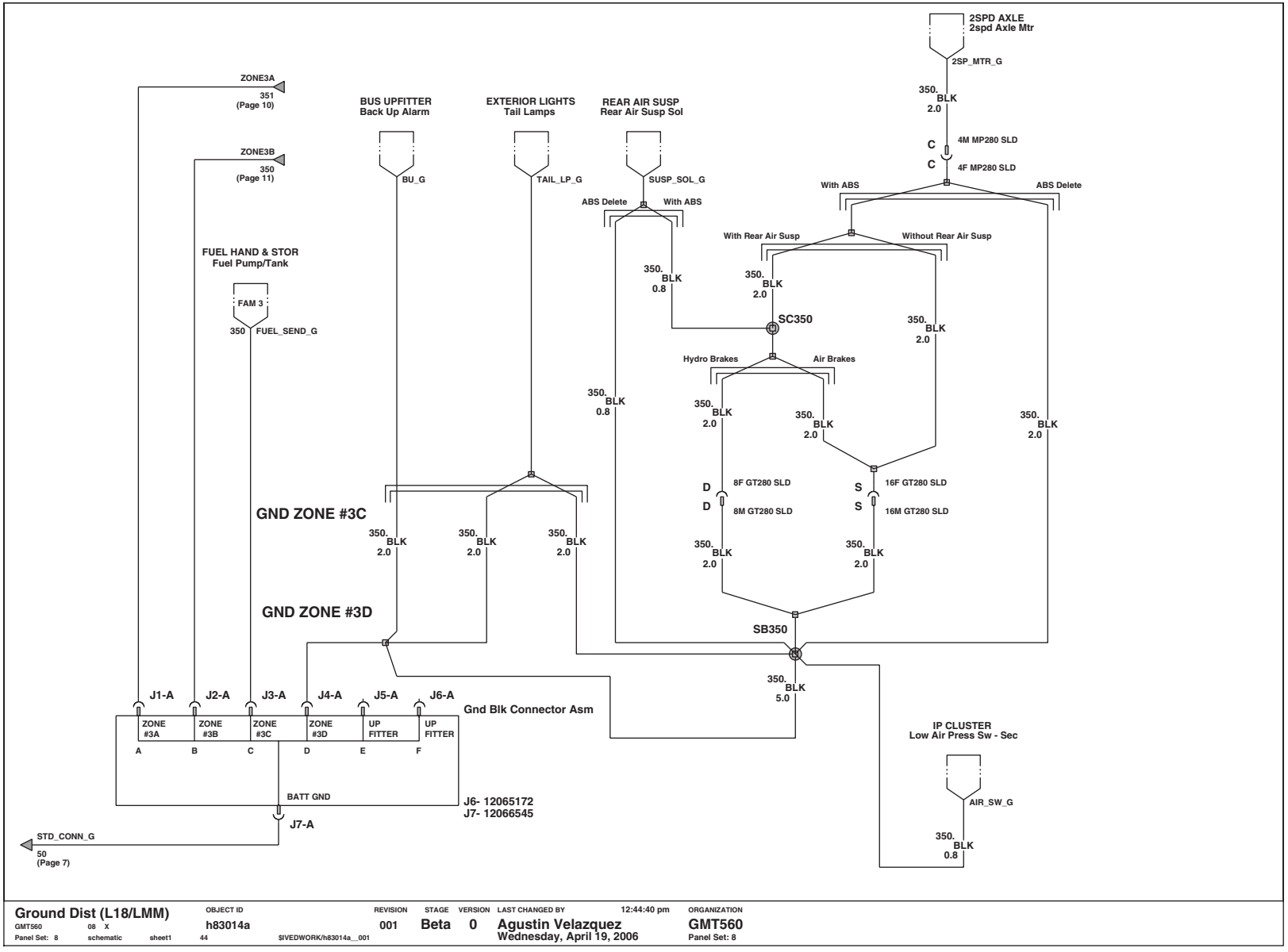


Ground Dist (L18/LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:44:40 pm	ORGANIZATION
GMT560 08 X	h83014a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 6 schematic sheet1 44 $IVEDWORK/h83014a__001					Wednesday, April 19, 2006		Panel Set: 6

Ground Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)

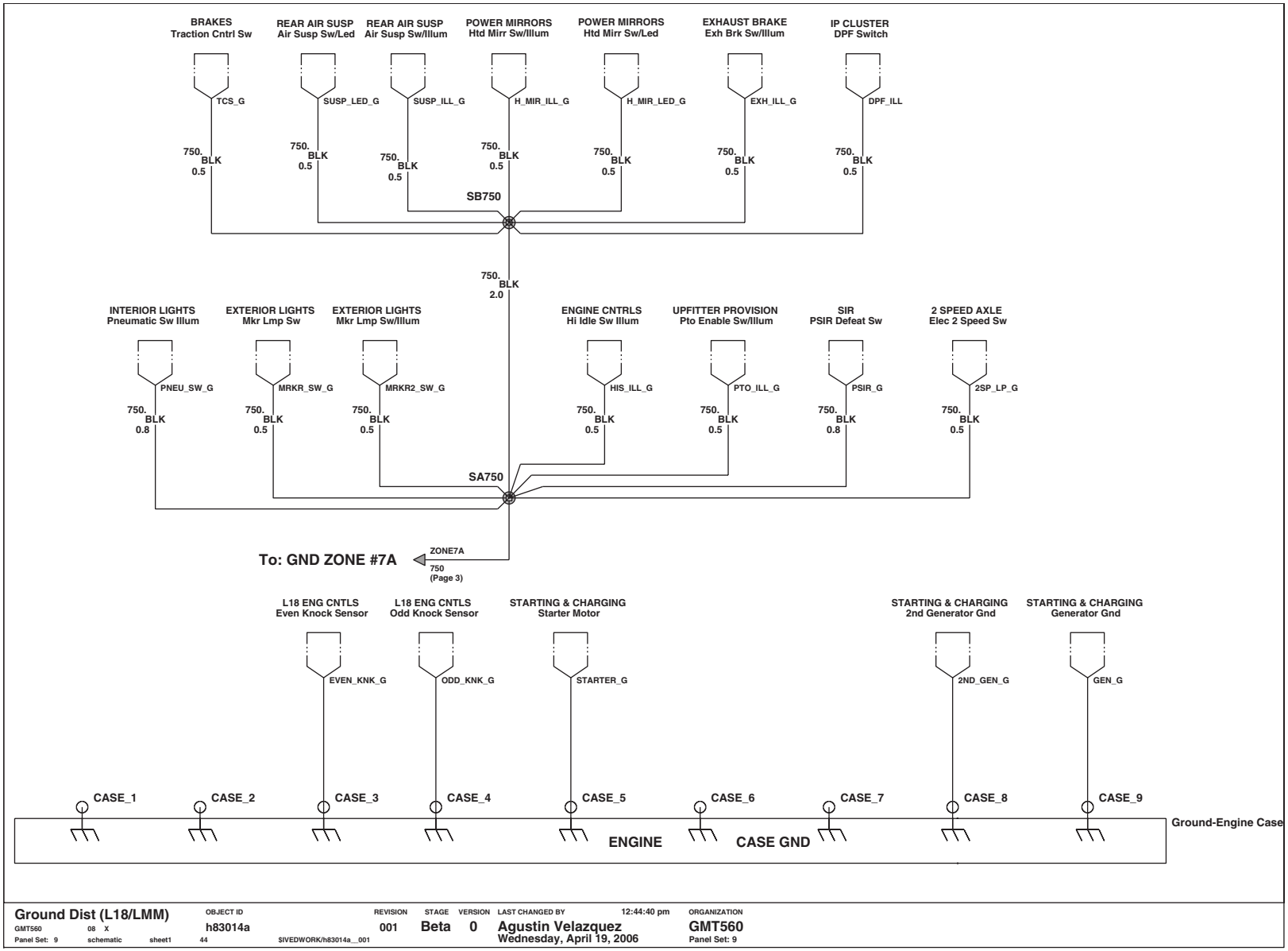


Ground Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)

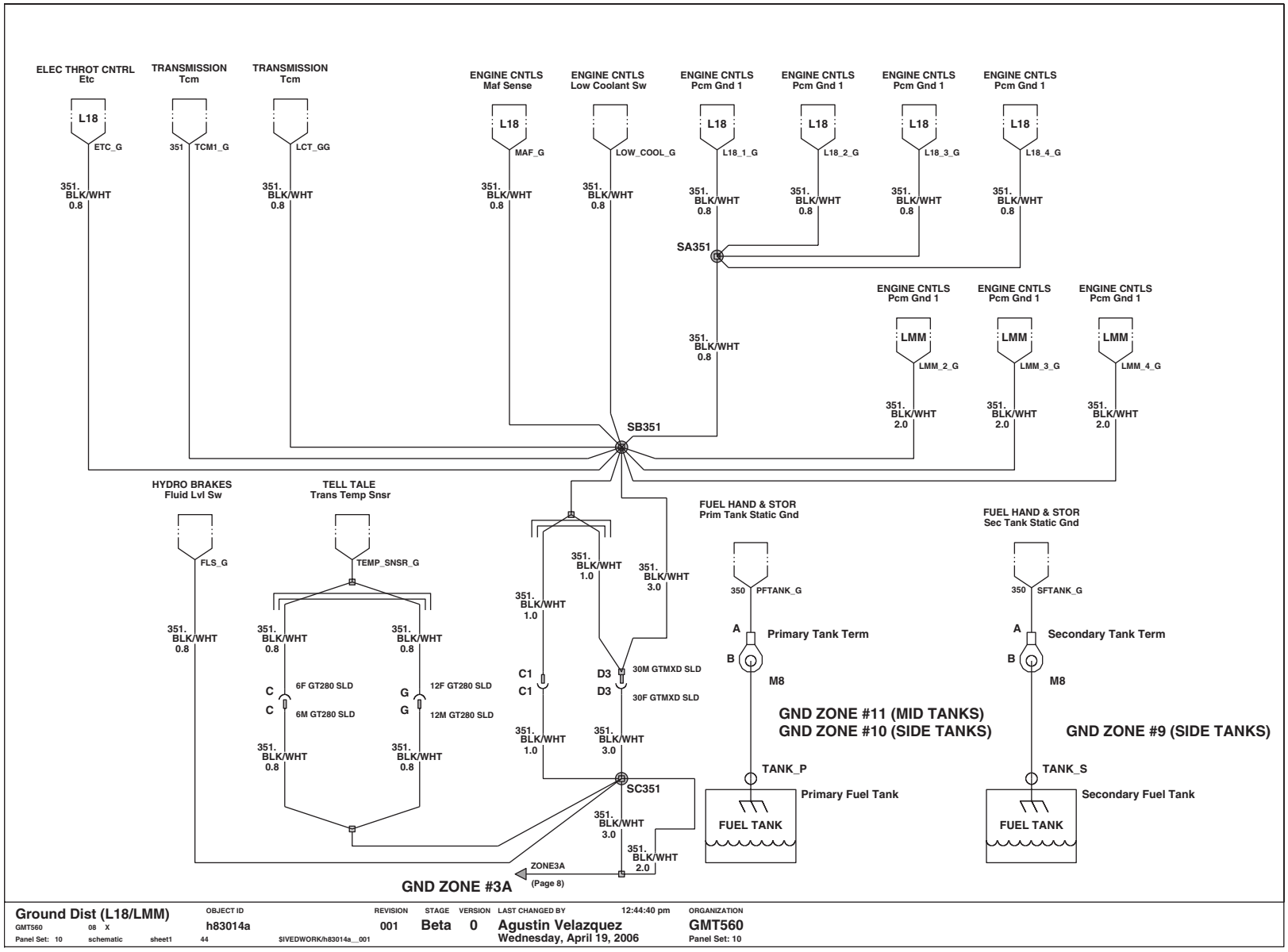


Ground Dist (L18/LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:44:40 pm	ORGANIZATION
GMT560 08 X	h83014a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 8 schematic sheet1 44	$IVEDWORK/h83014a__001				Wednesday, April 19, 2006		Panel Set: 8

Ground Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)

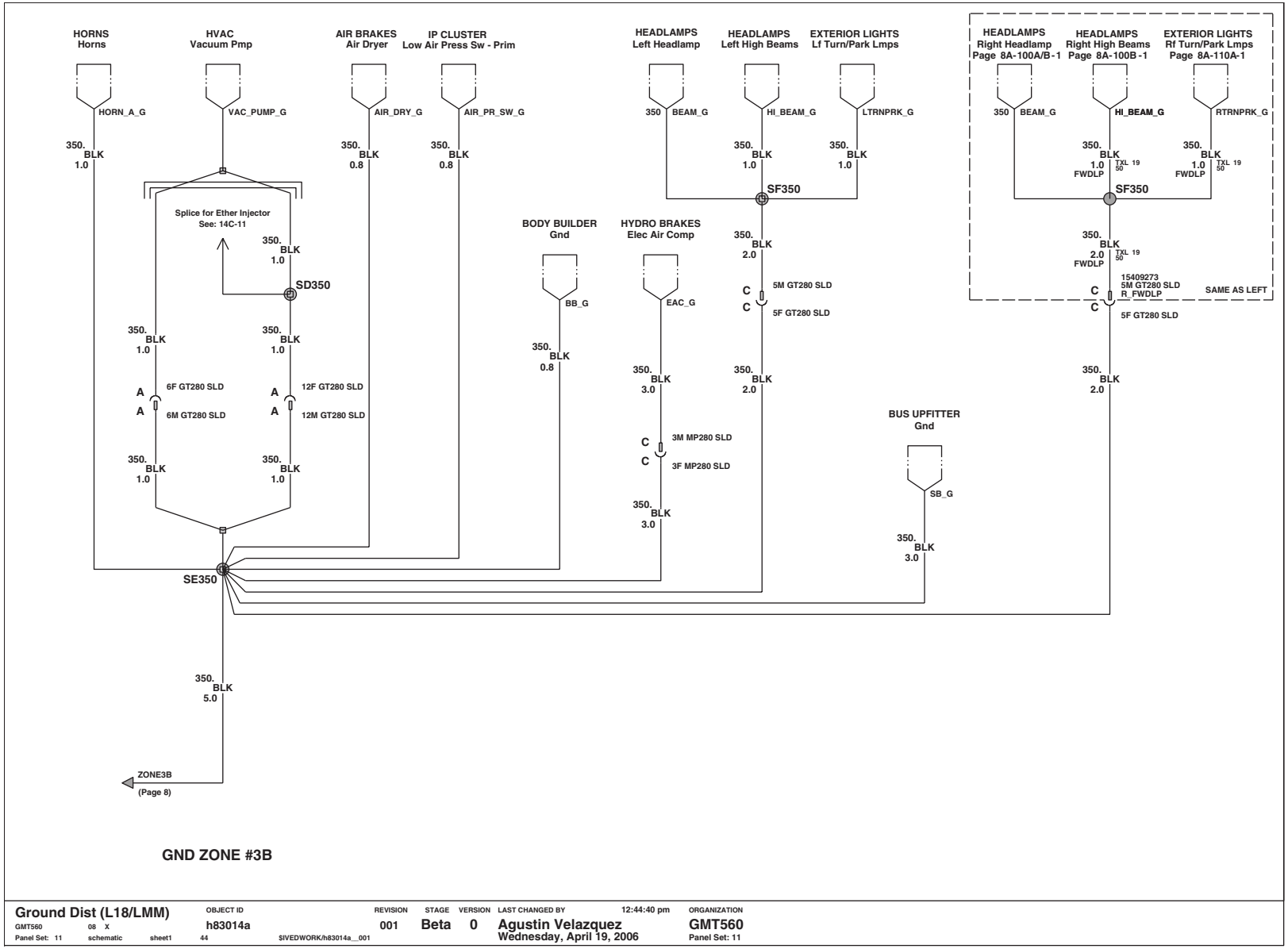


Ground Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



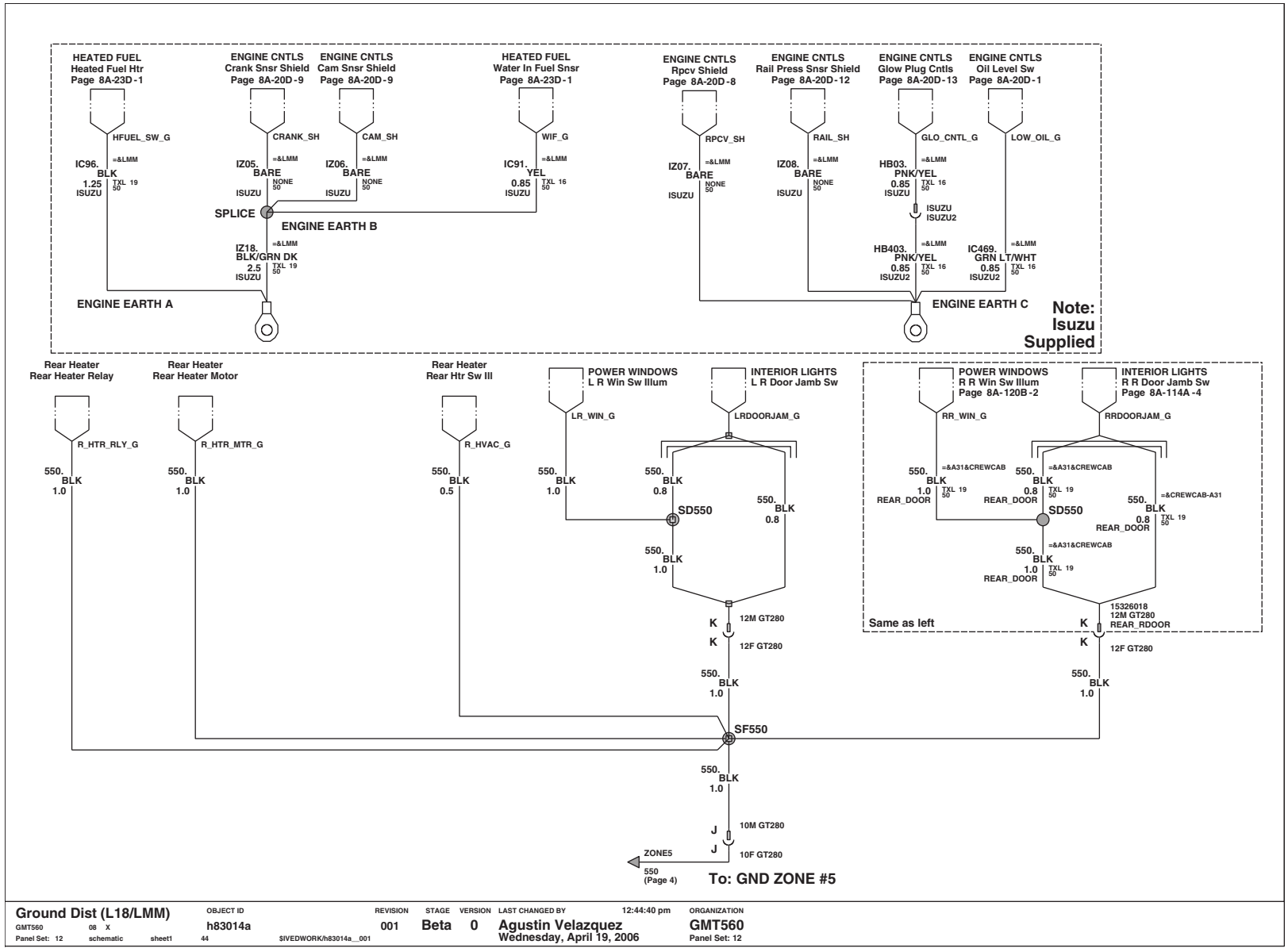
Ground Dist (L18/LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:44:40 pm	ORGANIZATION
GMT560 08 X	h83014a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 10 schematic sheet1 44	$IVEDWORK/h83014a__001				Wednesday, April 19, 2006		Panel Set: 10

Ground Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



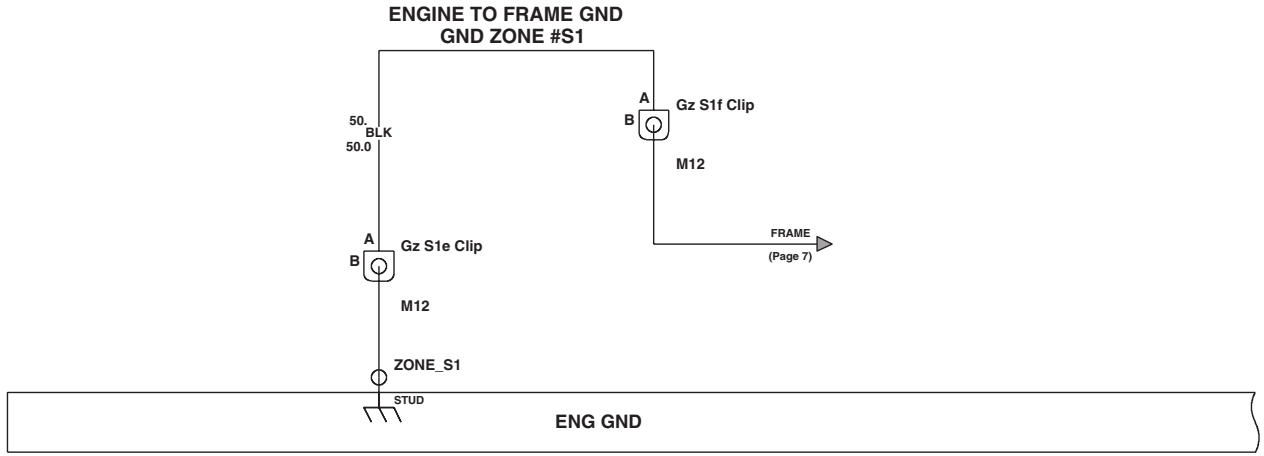
Ground Dist (L18/LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:44:40 pm	ORGANIZATION
GMT560 08 X	h83014a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 11 schematic sheet1 44	$IVEDWORK/h83014a__001				Wednesday, April 19, 2006		Panel Set: 11

Ground Distribution - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



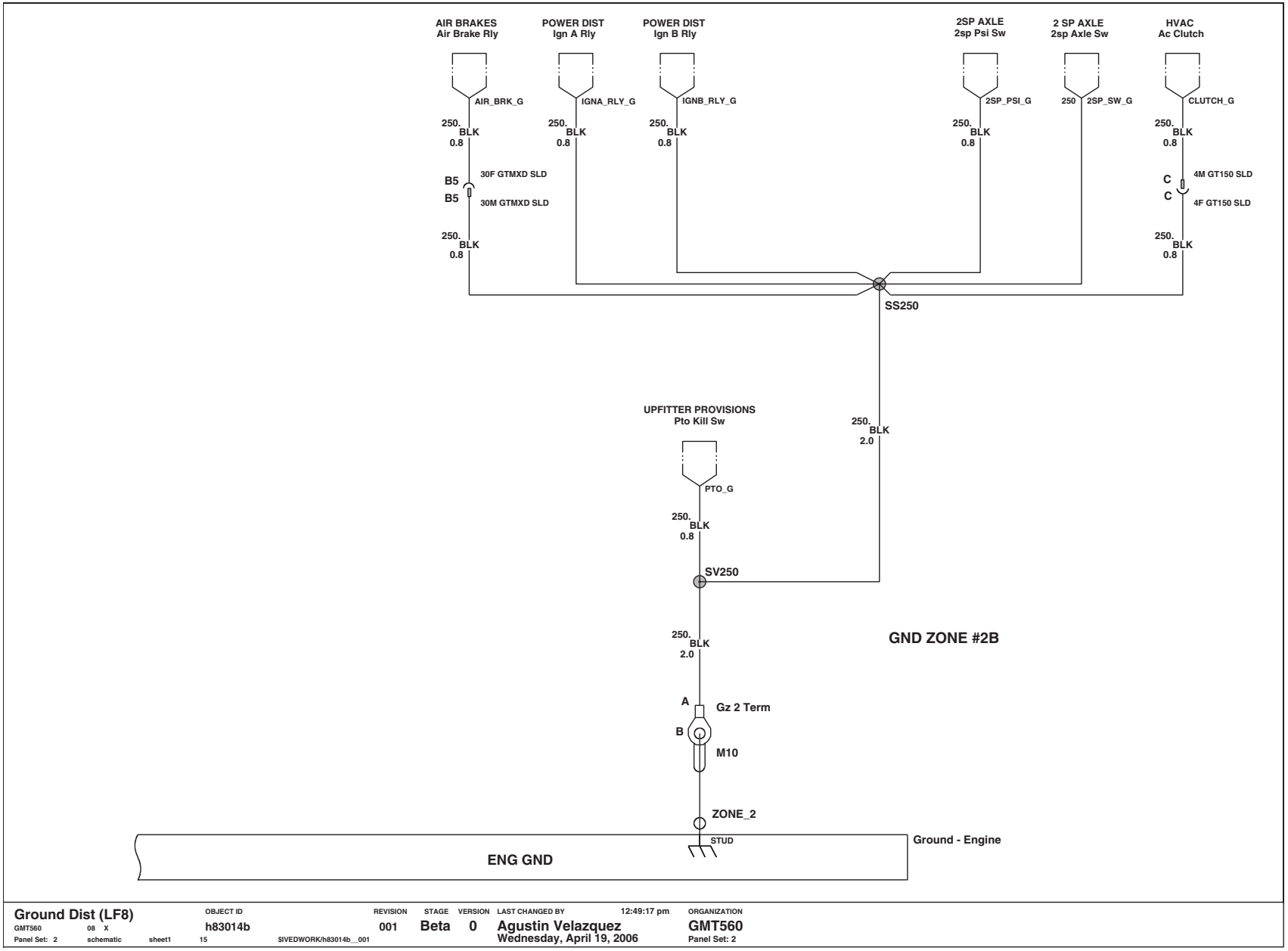
Ground Dist (L18/LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83014a	001	Beta	0	Agustin Velazquez	12:44:40 pm	GMT560
Panel Set: 12 schematic sheet1 44	$IVEDWORK/h83014a__001				Wednesday, April 19, 2006		Panel Set: 12

Ground Distribution (LF8) 7.8L L6 Isuzu 6H - Diesel

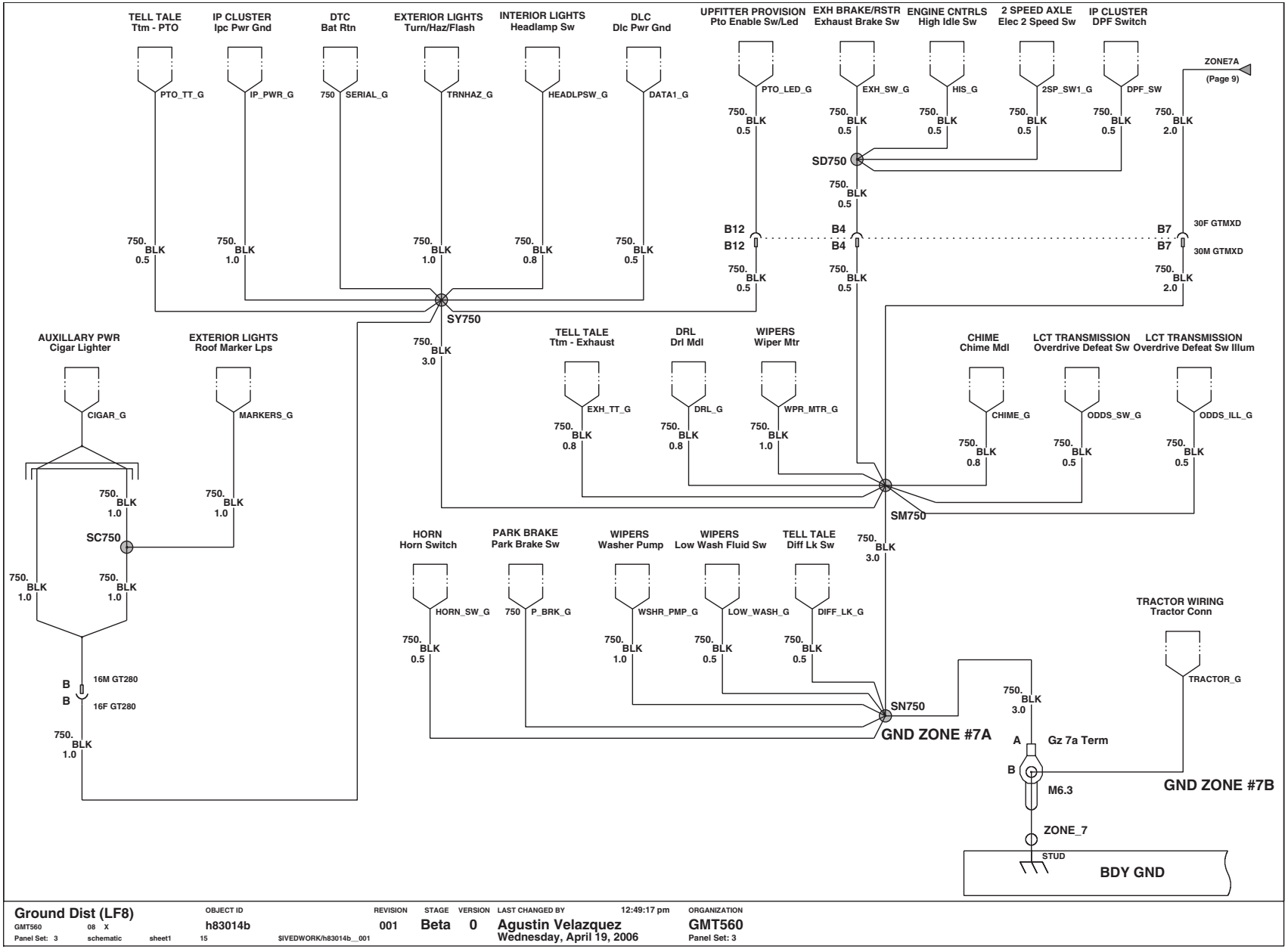


Ground Dist (LF8) | OBJECT ID | REVISION | STAGE | VERSION | LAST CHANGED BY | 12:49:17 pm | ORGANIZATION
GMT560 08 X | h83014b | 001 | Beta | 0 | Agustin Velazquez | GMT560
Panel Set: 1 schematic sheet1 15 $IVEDWORK/h83014b__001 | Wednesday, April 19, 2006 | Panel Set: 1

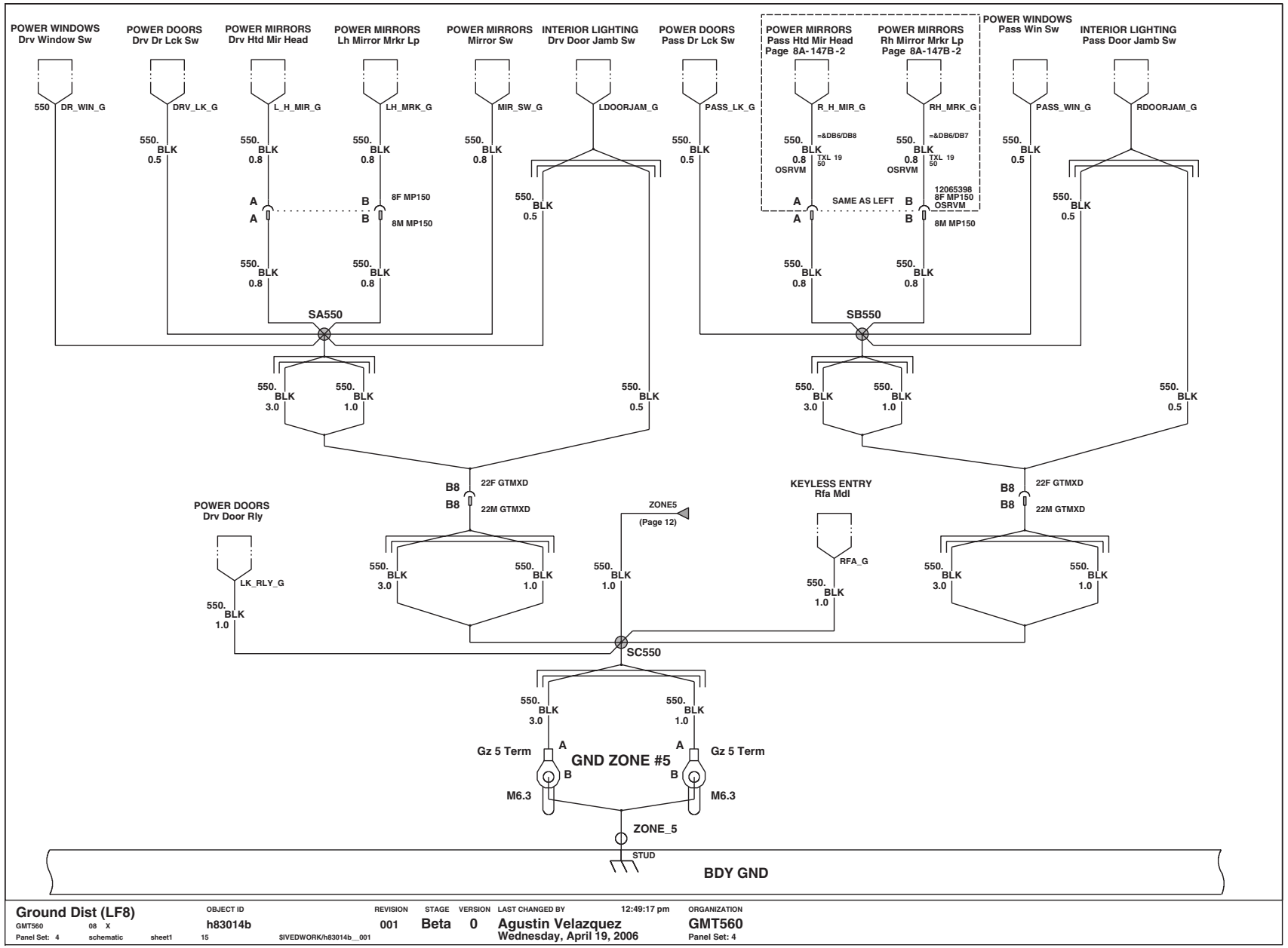
Ground Distribution (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



Ground Distribution (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)

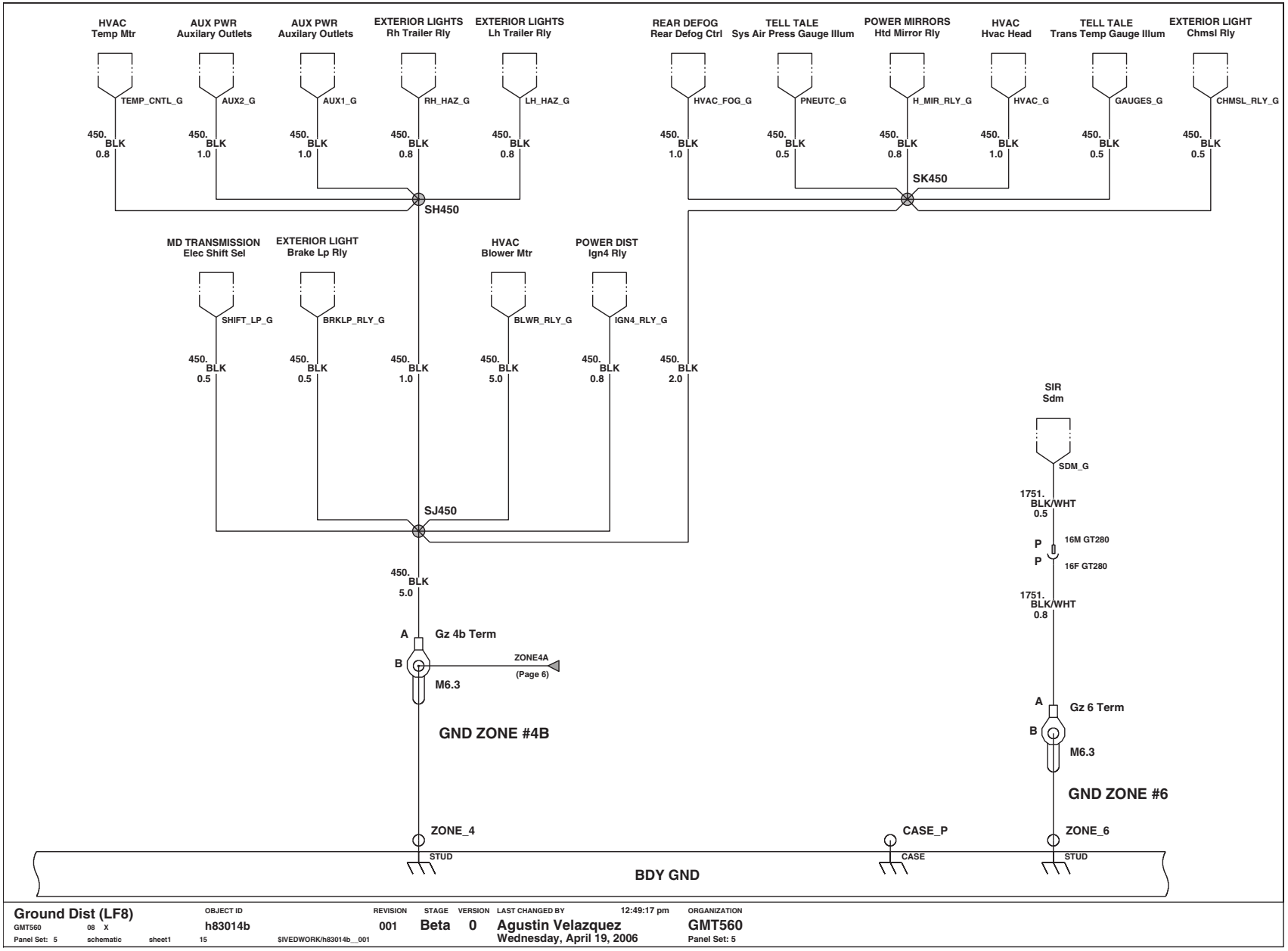


Ground Distribution (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)

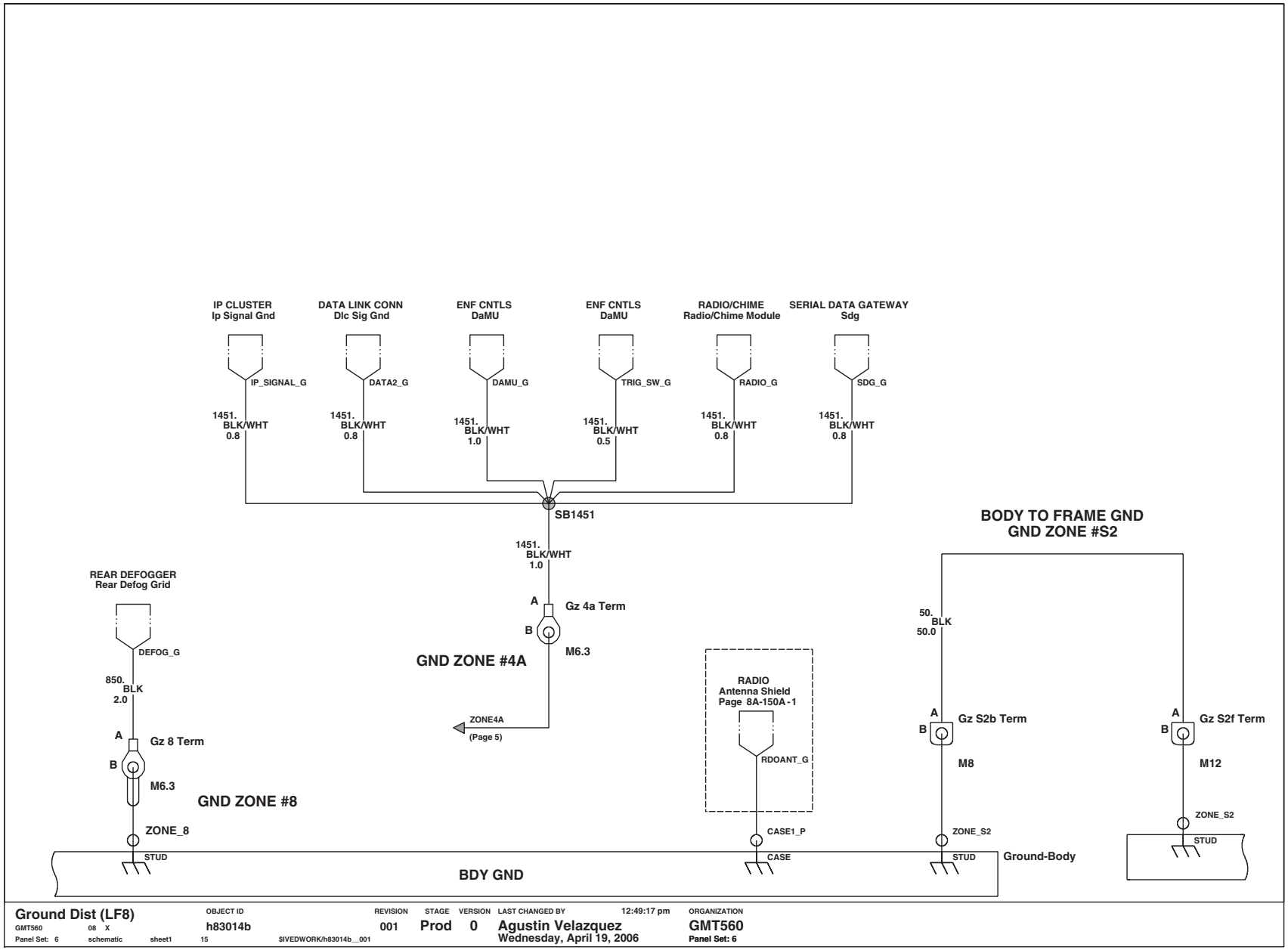


Ground Dist (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:49:17 pm	ORGANIZATION
GMT560 08 X	h83014b	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 4 schematic sheet1 15	$IVEDWORK/h83014b__001				Wednesday, April 19, 2006		Panel Set: 4

Ground Distribution (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)

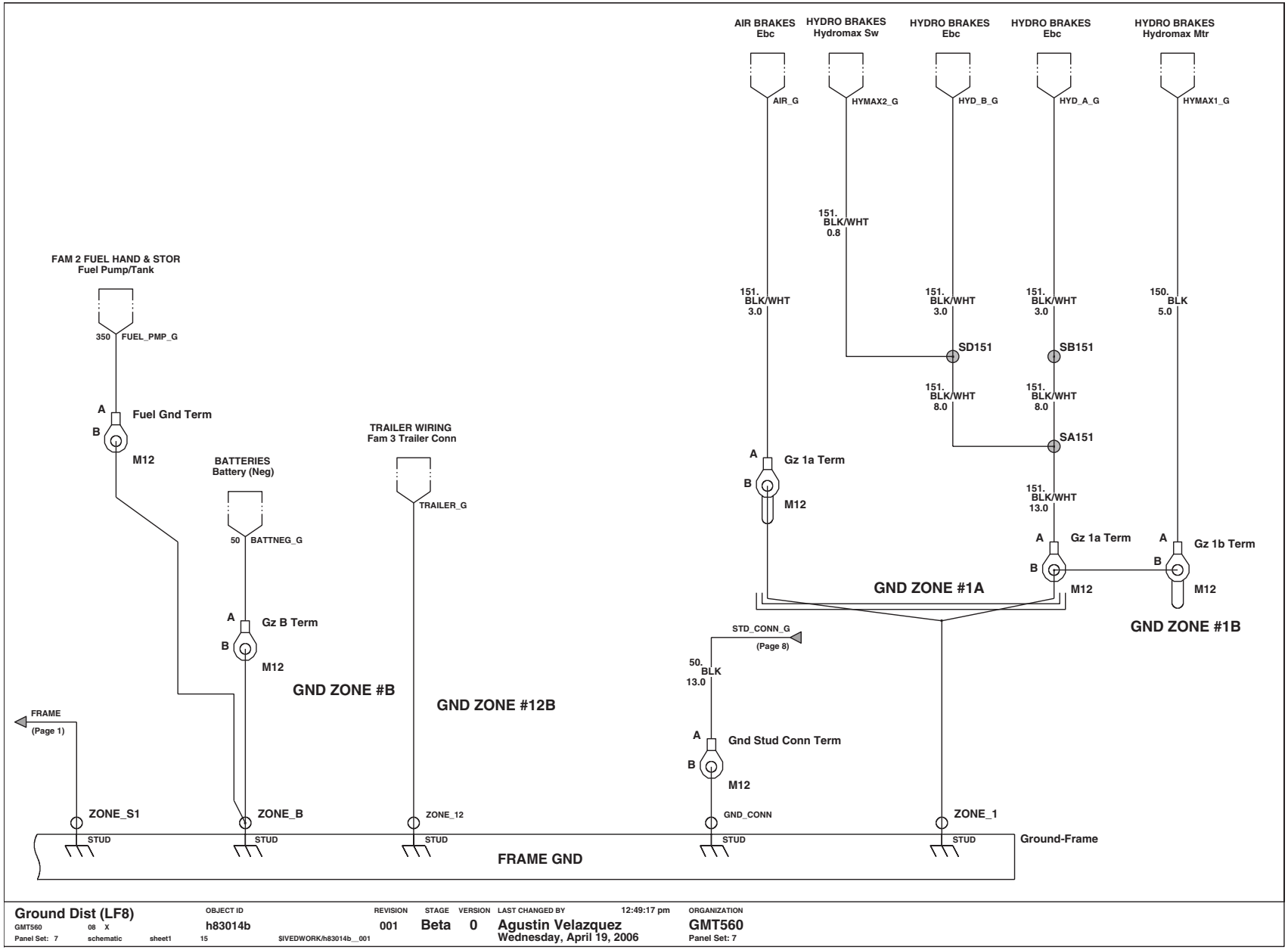


Ground Distribution (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)

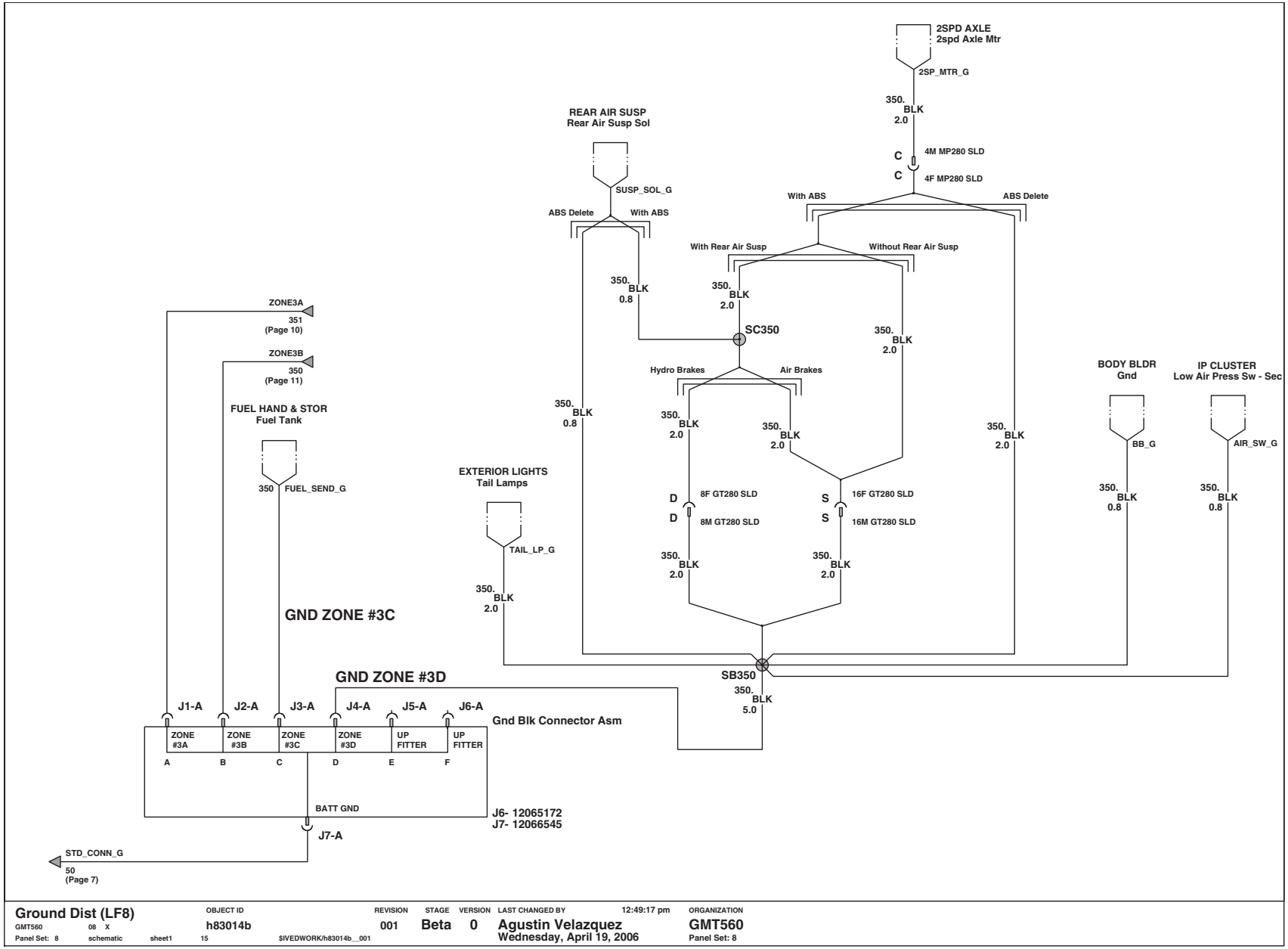


Ground Dist (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:49:17 pm	ORGANIZATION
GMT560 08 X	h83014b	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 6 schematic sheet1 15	$IVEDWORK/h83014b__001				Wednesday, April 19, 2006		Panel Set: 6

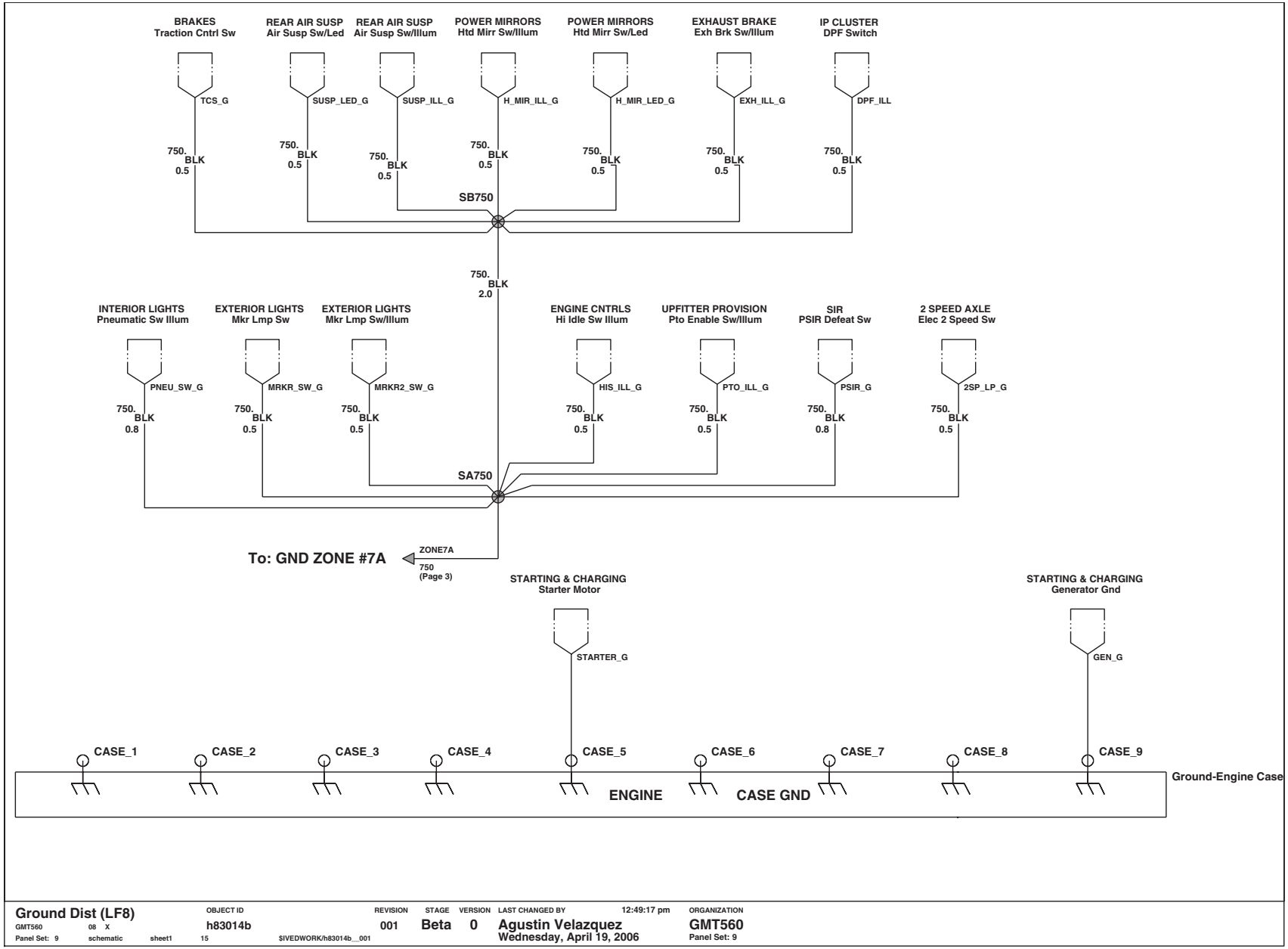
Ground Distribution (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



Ground Distribution (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)

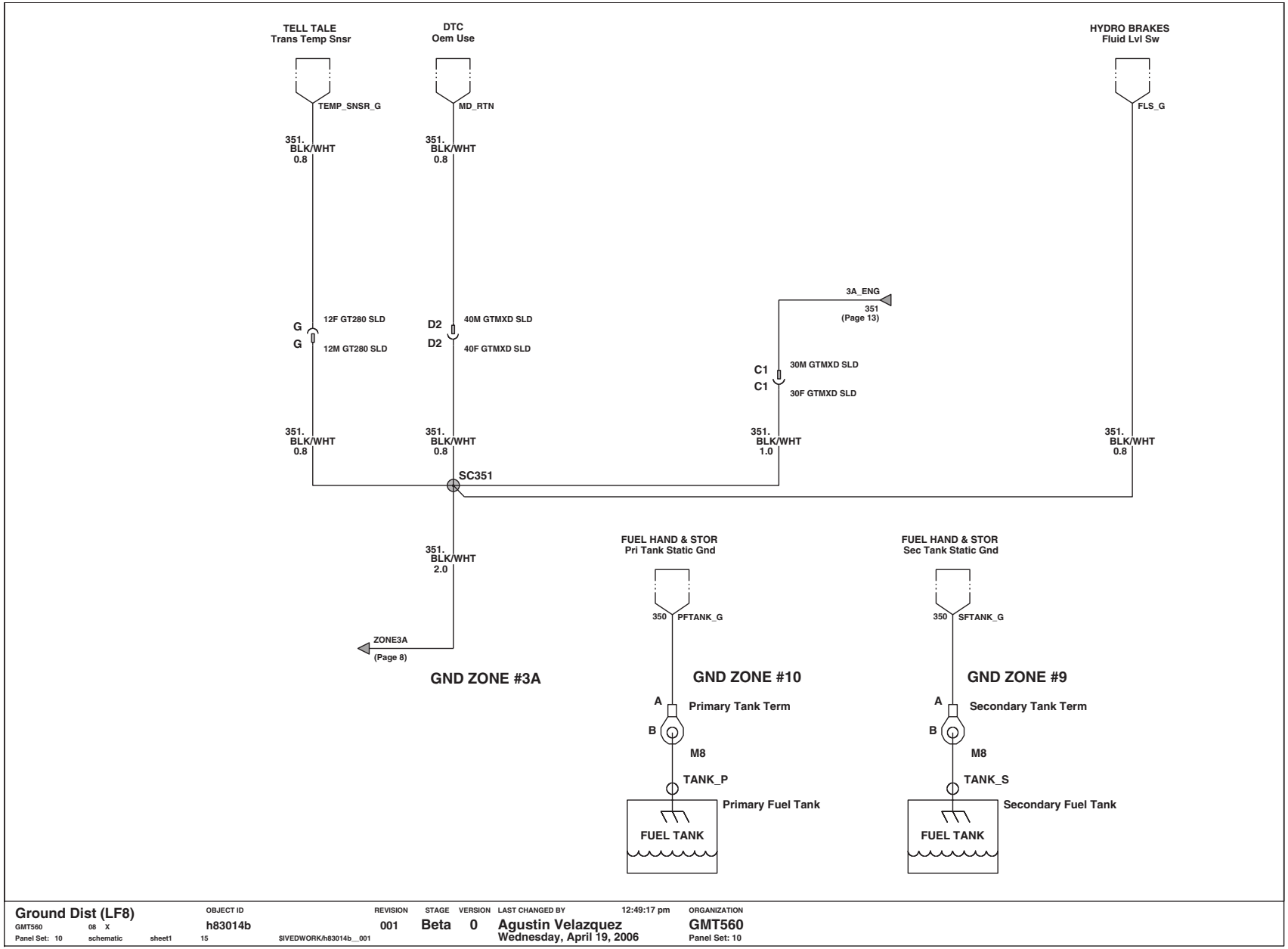


Ground Distribution (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)

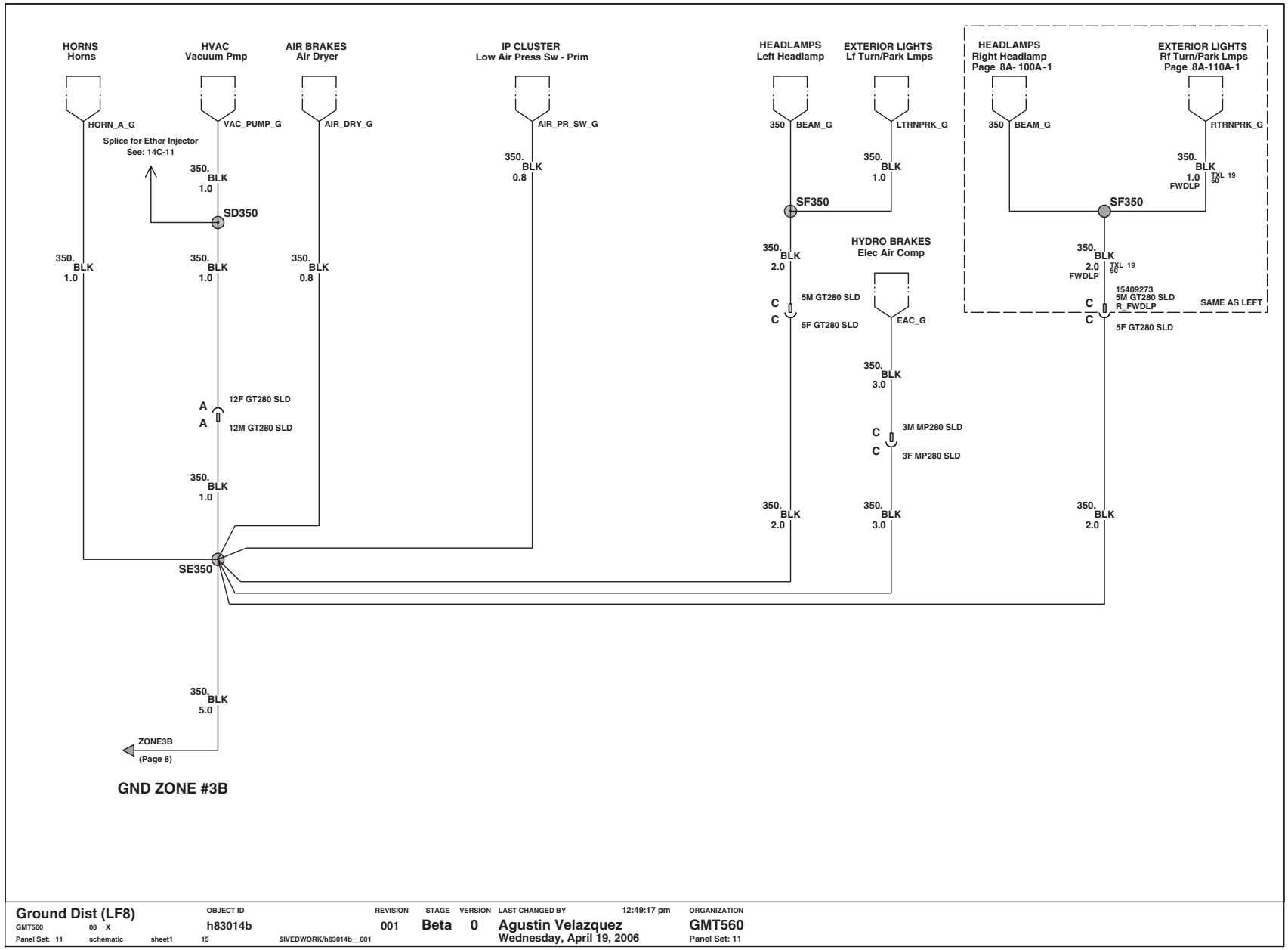


Ground Dist (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:49:17 pm	ORGANIZATION
GMT560 08 X	h83014b	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 9 schematic sheet1 15	$IVEDWORK/h83014b__001				Wednesday, April 19, 2006		Panel Set: 9

Ground Distribution (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)

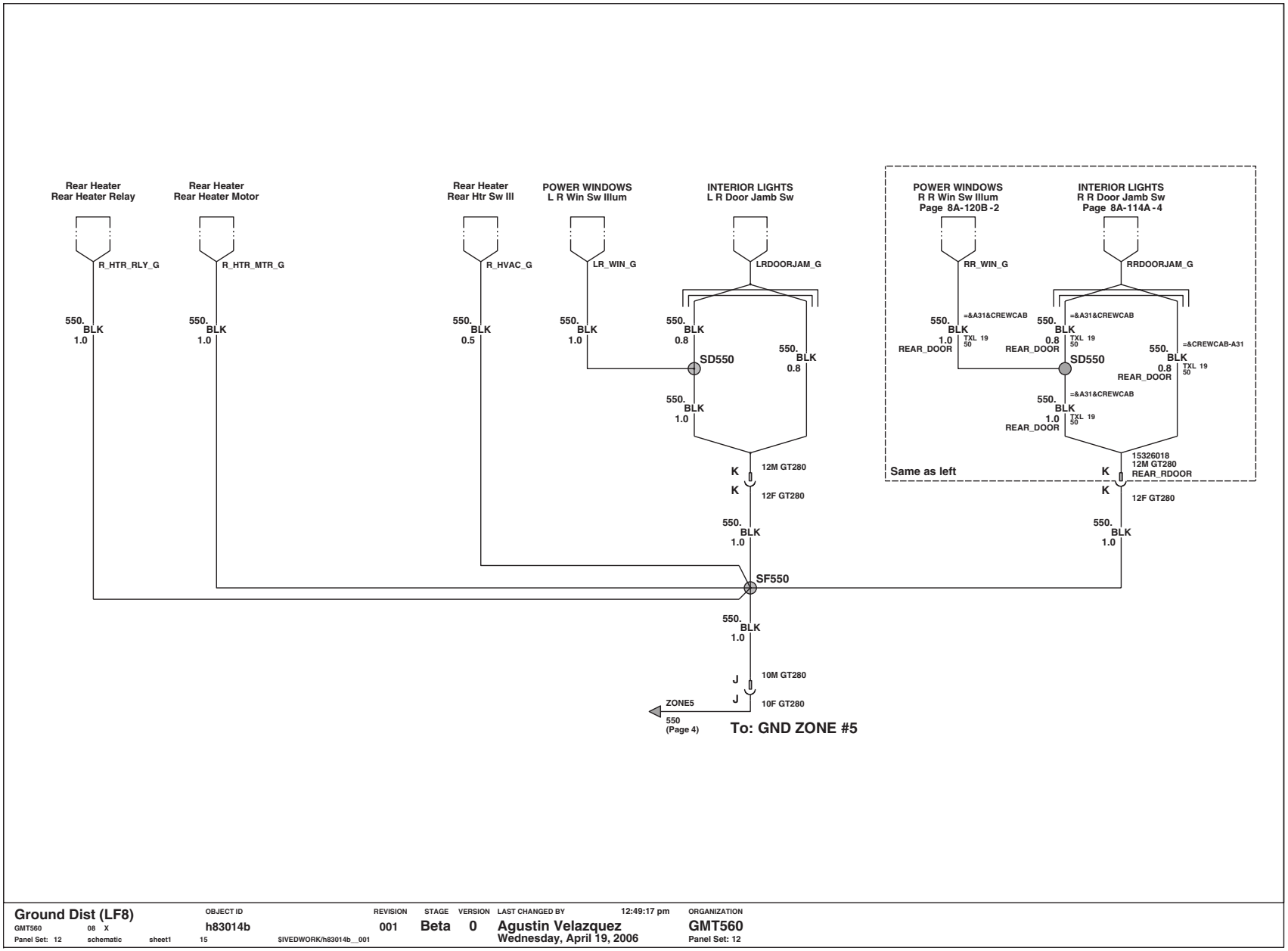


Ground Distribution (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



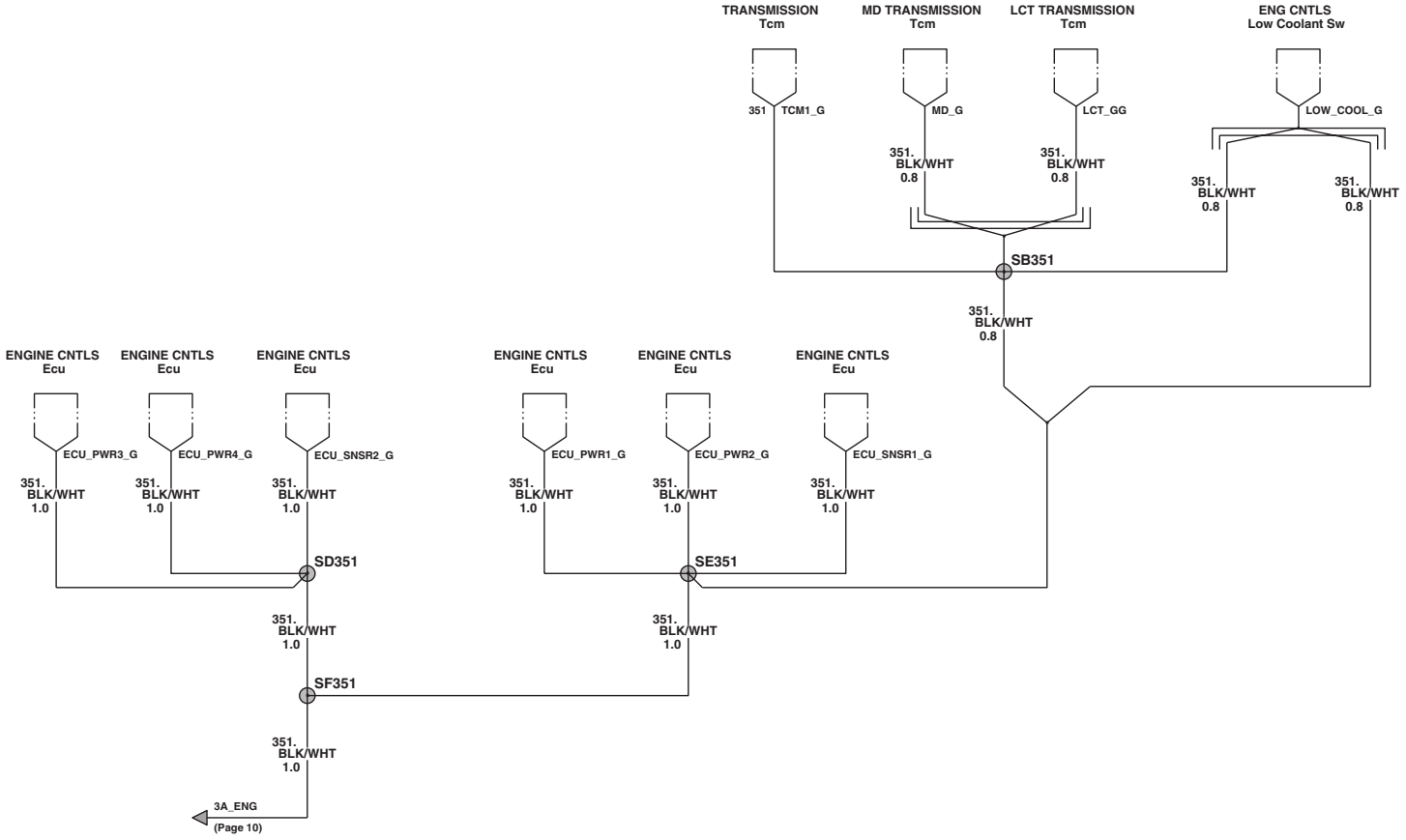
Ground Dist (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83014b	001	Beta	0	Agustin Velazquez	12:49:17 pm	GMT560
Panel Set: 11 schematic sheet1 15	$IVEDWORK/h83014b__001				Wednesday, April 19, 2006		Panel Set: 11

Ground Distribution (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



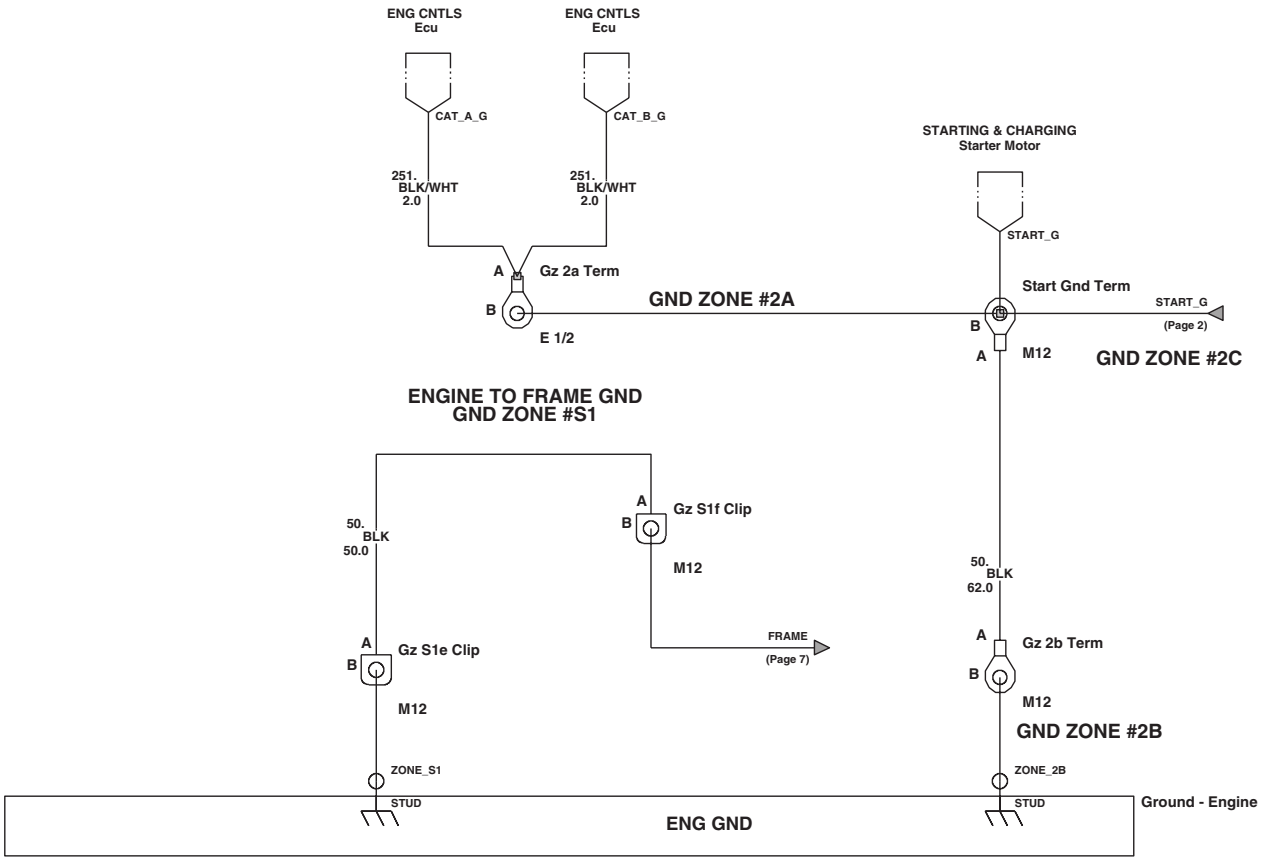
Ground Dist (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:49:17 pm	ORGANIZATION
GMT560 08 X	h83014b	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 12 schematic sheet1 15	$IVEDWORK/h83014b__001				Wednesday, April 19, 2006		Panel Set: 12

Ground Distribution (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



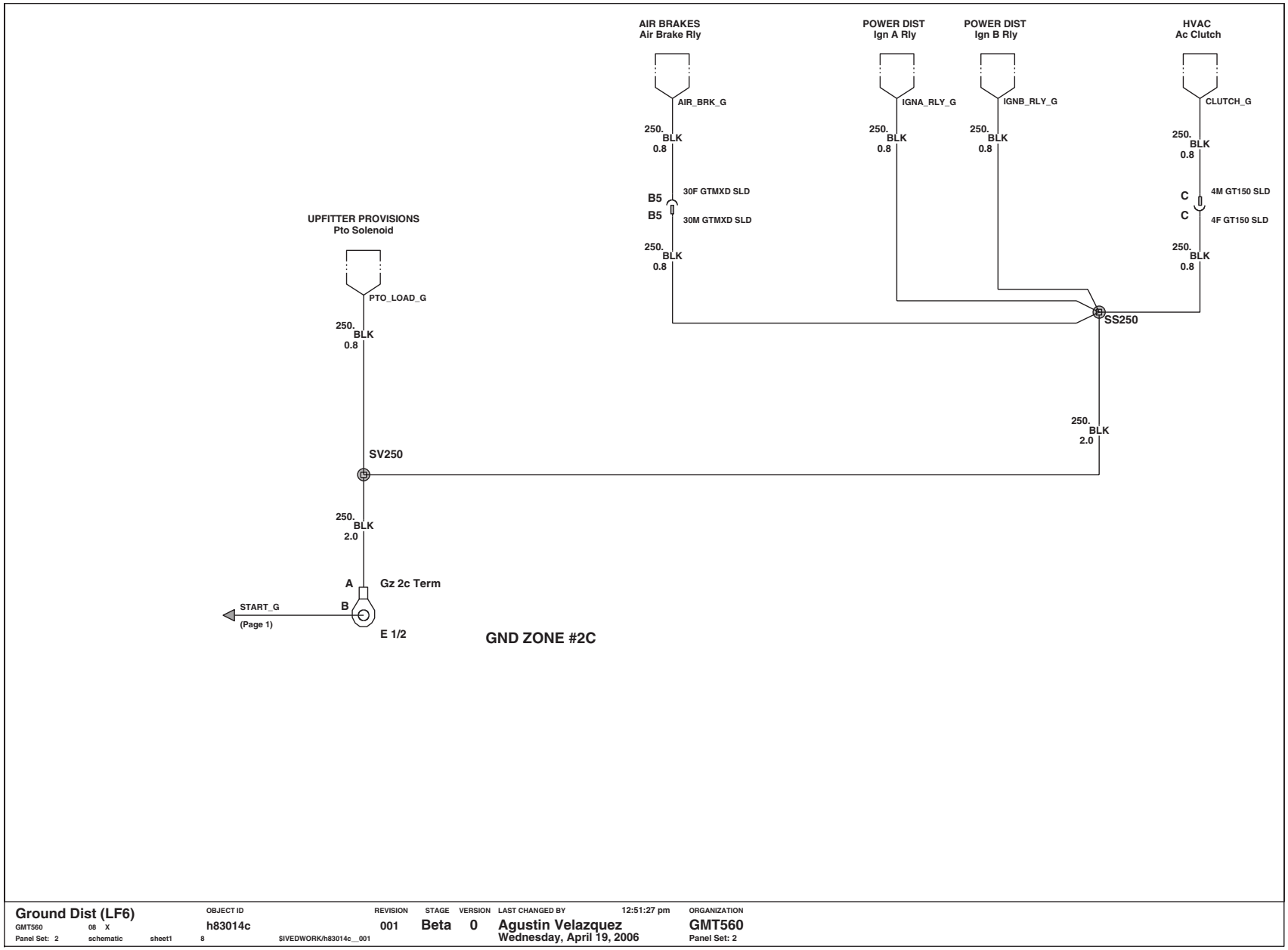
Ground Dist (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:49:17 pm	ORGANIZATION
GMT560 08 X	h83014b	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 13 schematic sheet1 15	$IVEDWORK/h83014b__001				Wednesday, April 19, 2006		Panel Set: 13

Ground Distribution (LF6) 7.2L L6 Caterpillar® C7 - Diesel

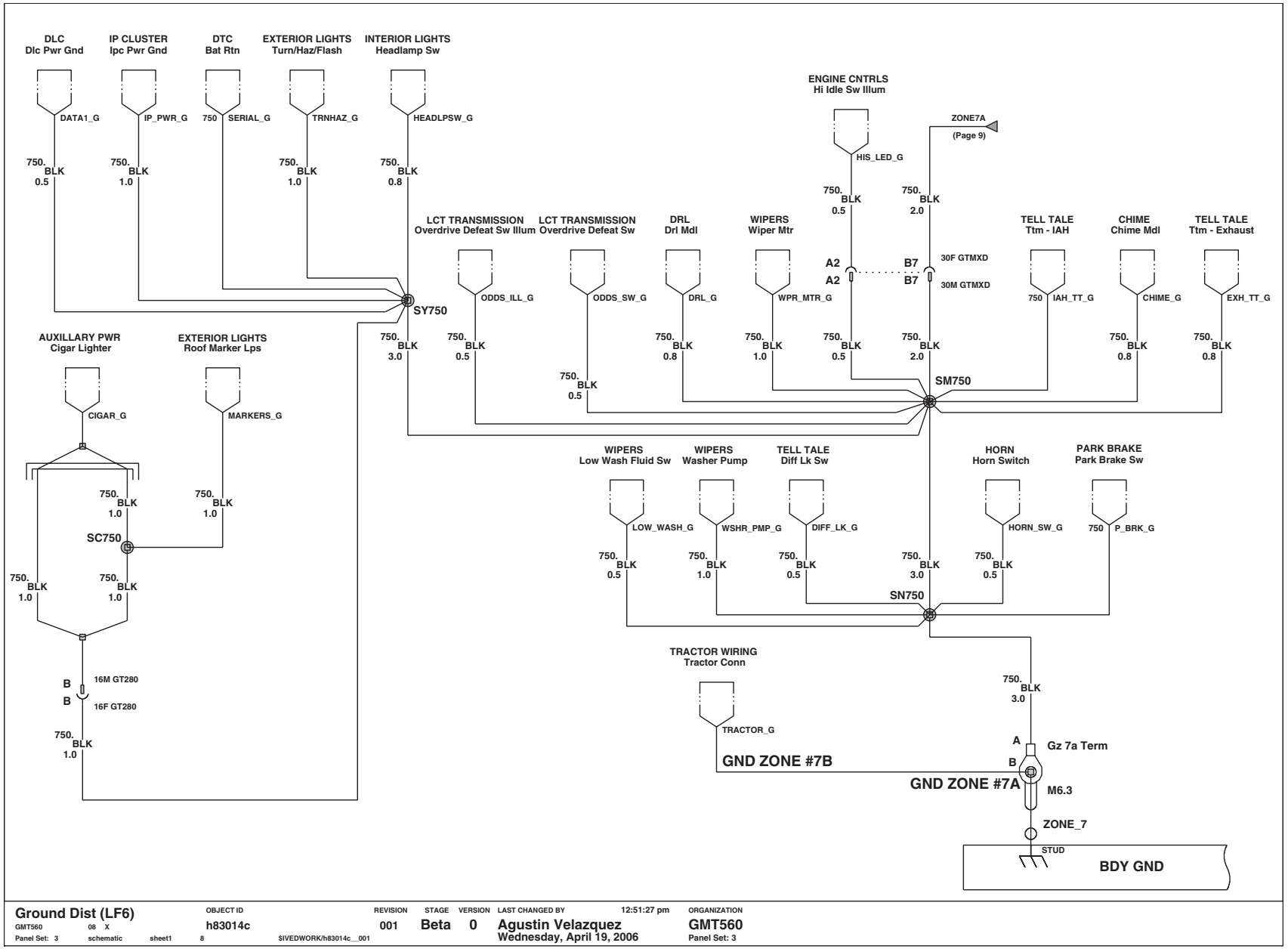


Ground Dist (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:51:27 pm	ORGANIZATION
GMT560 08 X	h83014c	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 8 $IVEDWORK/h83014c__001					Wednesday, April 19, 2006		Panel Set: 1

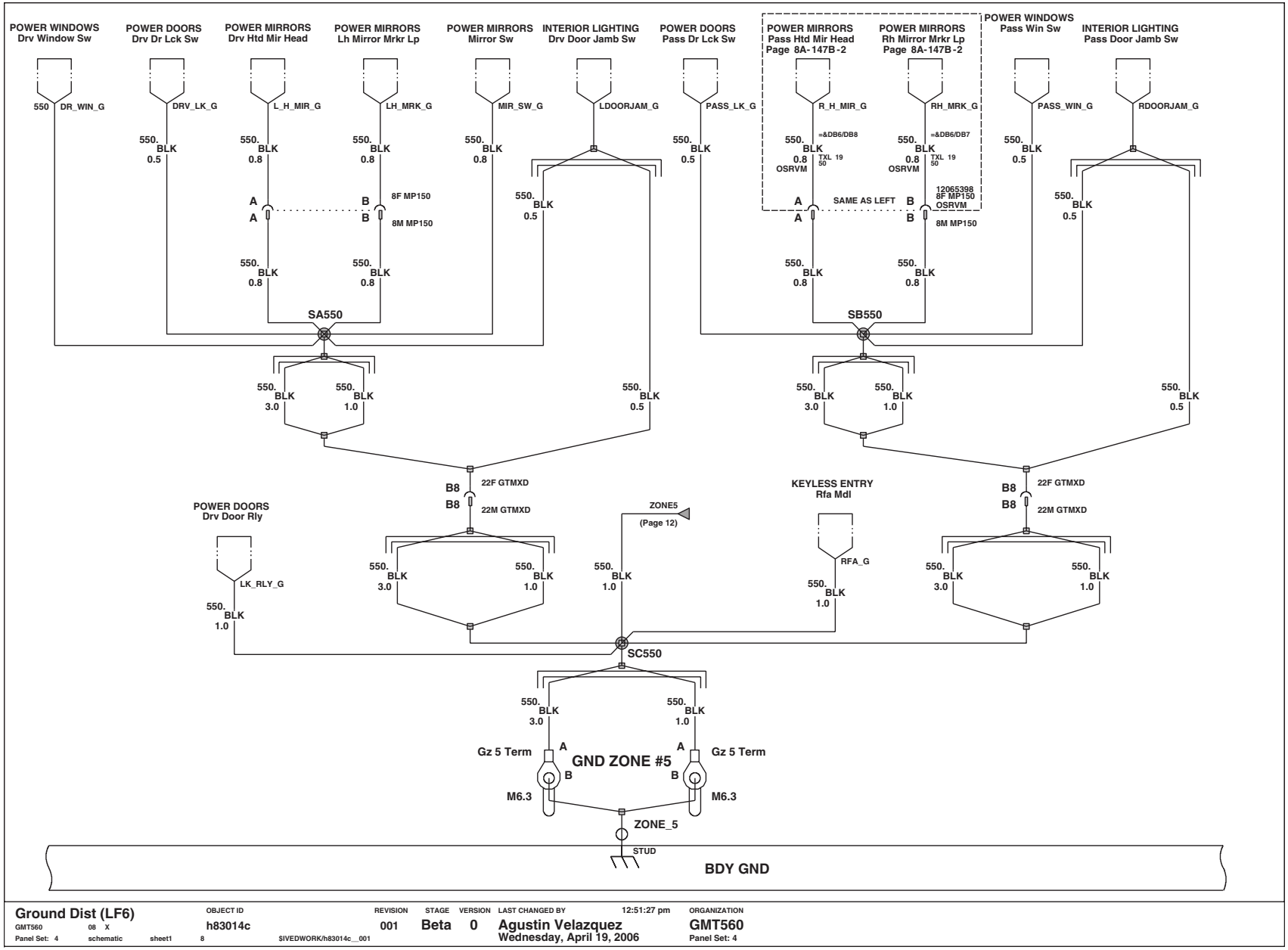
Ground Distribution (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



Ground Distribution (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)

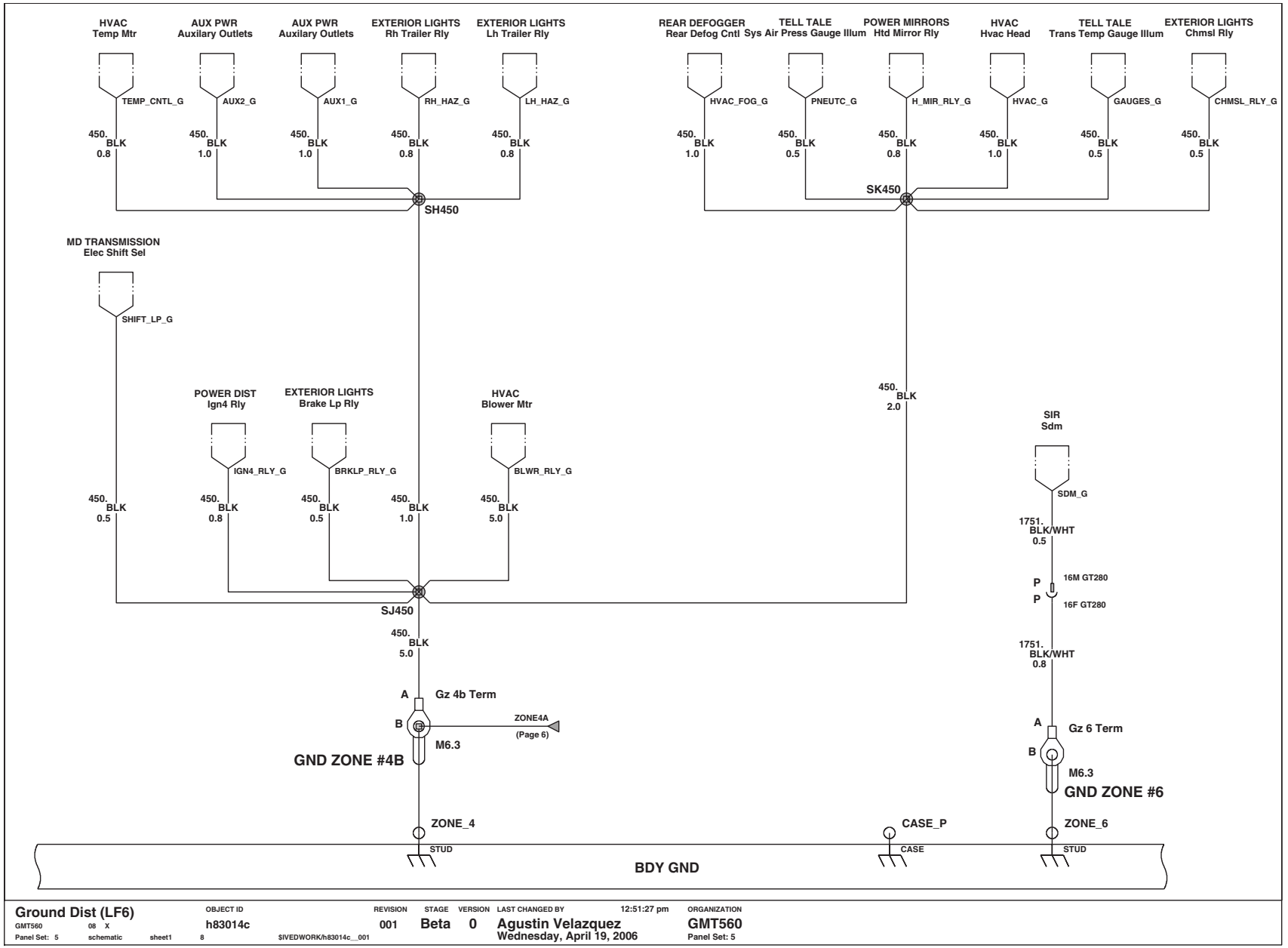


Ground Distribution (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



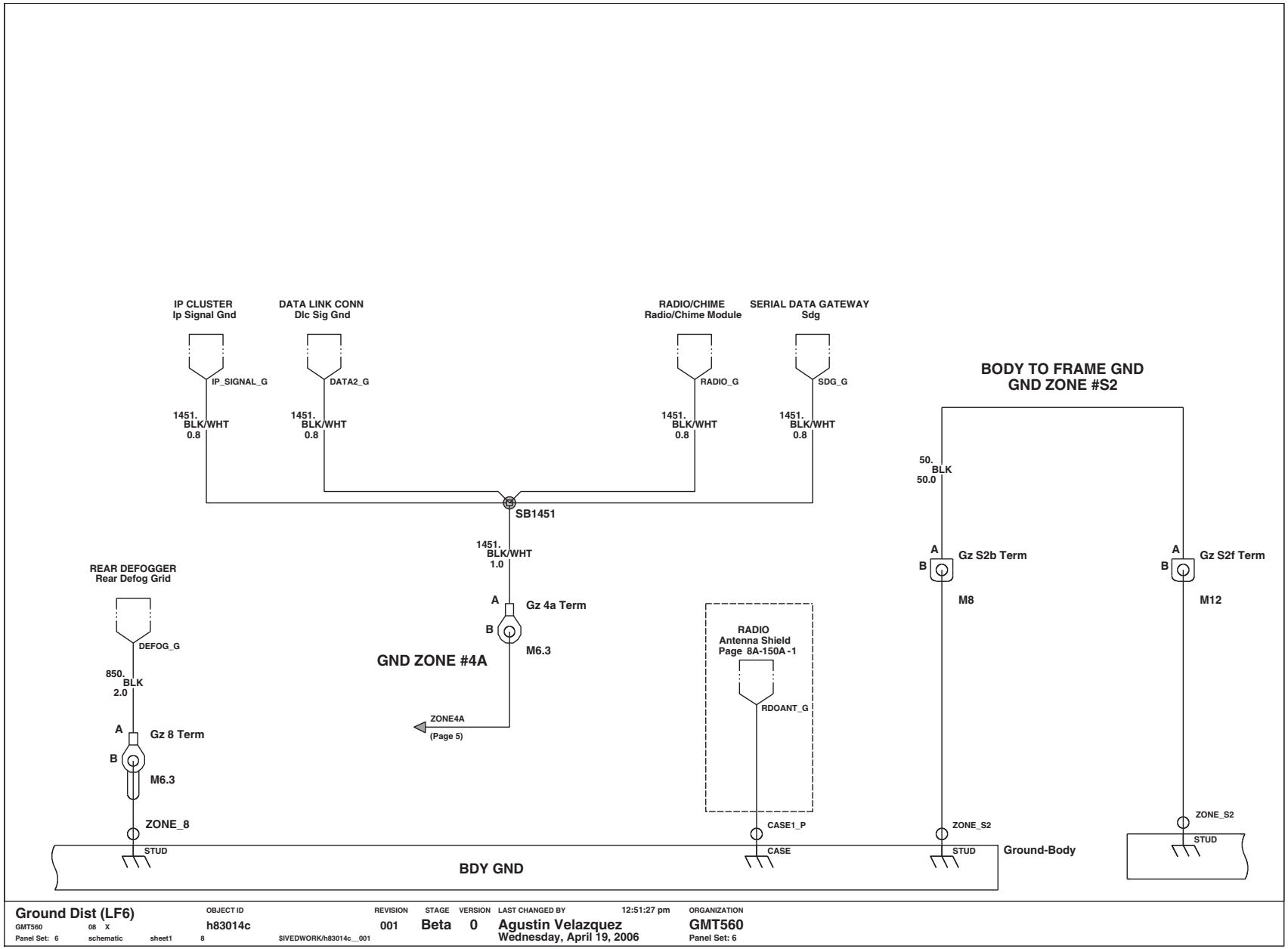
Ground Dist (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:51:27 pm	ORGANIZATION
GMT560 08 X	h83014c	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 4 schematic sheet1 8	$IVEDWORK/h83014c__001				Wednesday, April 19, 2006		Panel Set: 4

Ground Distribution (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



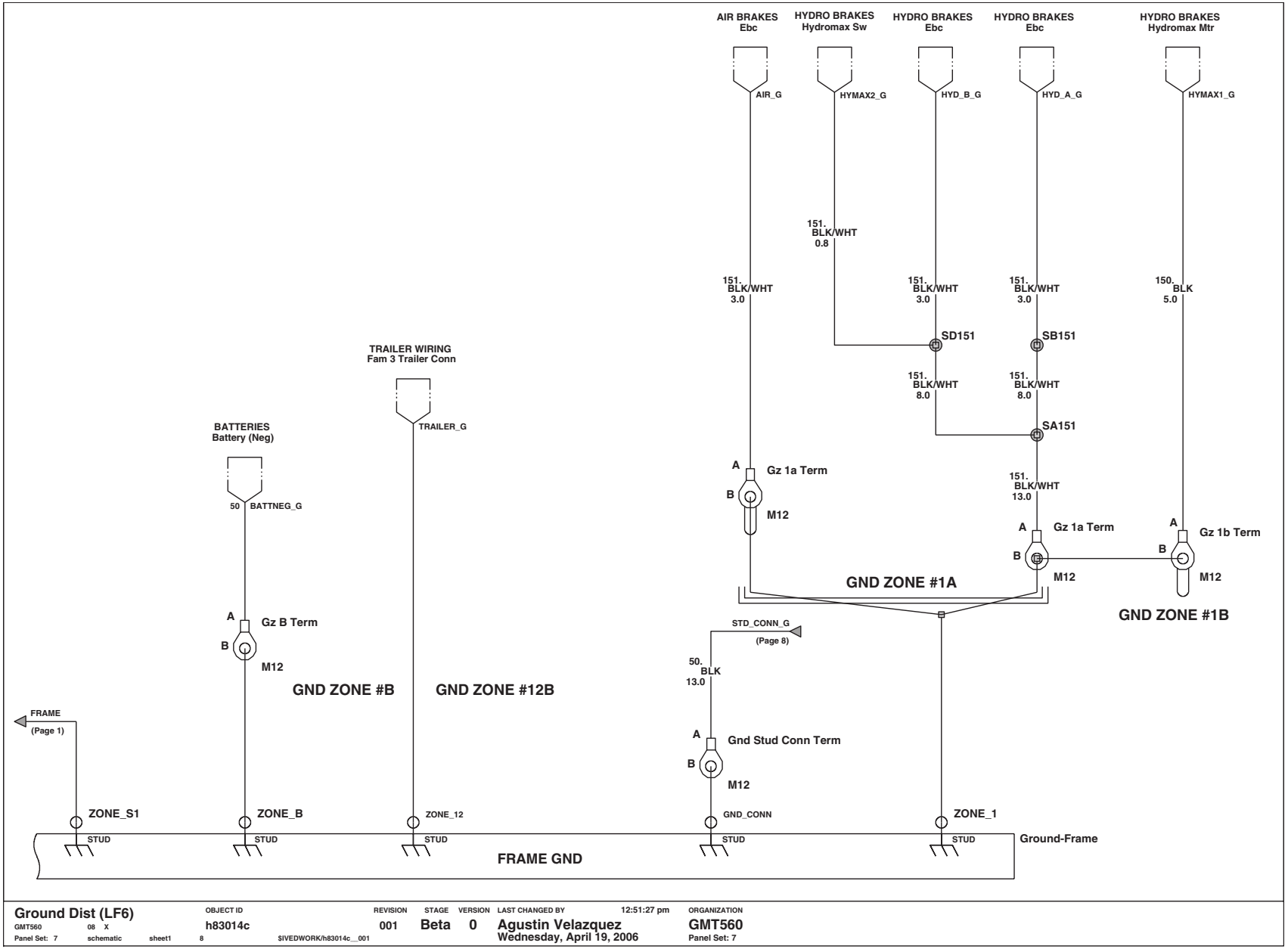
Ground Dist (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83014c	001	Beta	0	Agustin Velazquez	12:51:27 pm	GMT560
Panel Set: 5 schematic sheet1 8	$IVEDWORK/h83014c__001				Wednesday, April 19, 2006		Panel Set: 5

Ground Distribution (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



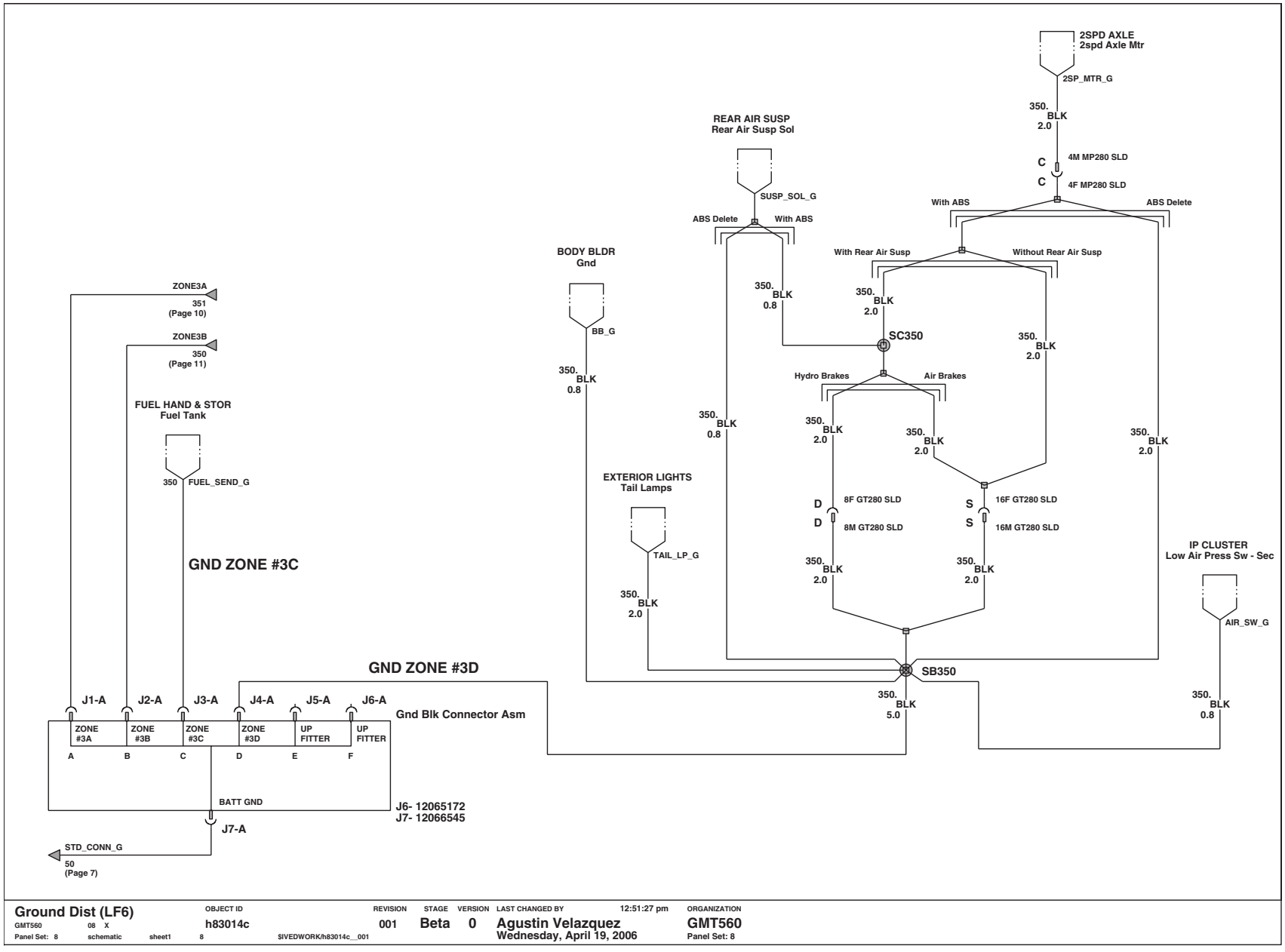
Ground Dist (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:51:27 pm	ORGANIZATION
GMT560 08 X	h83014c	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 6 schematic sheet1 8	$IVEDWORK/h83014c__001				Wednesday, April 19, 2006		Panel Set: 6

Ground Distribution (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



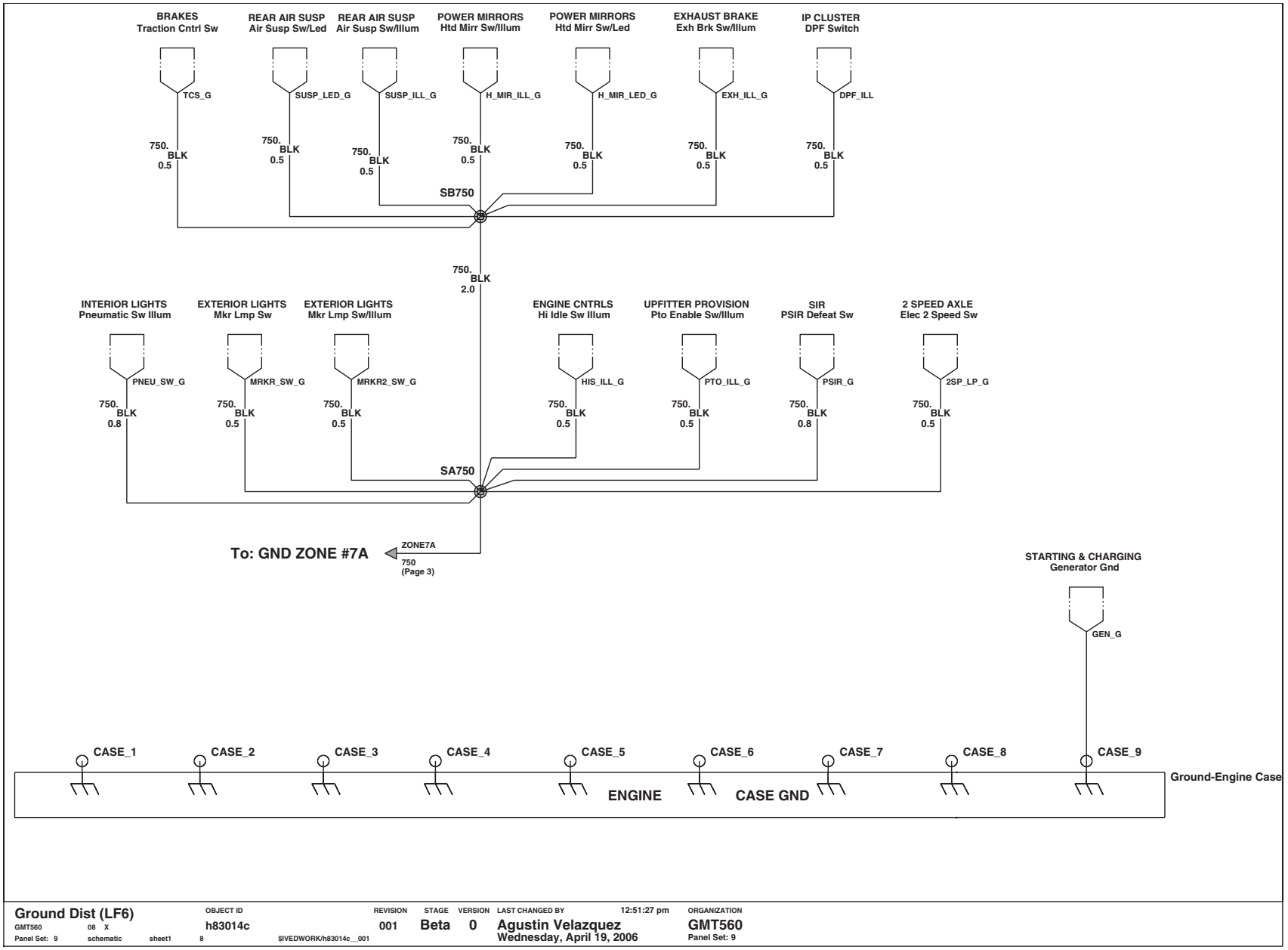
Ground Dist (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:51:27 pm	ORGANIZATION
GMT560 08 X	h83014c	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 7 schematic sheet1 8	$IVEDWORK/h83014c__001				Wednesday, April 19, 2006		Panel Set: 7

Ground Distribution (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



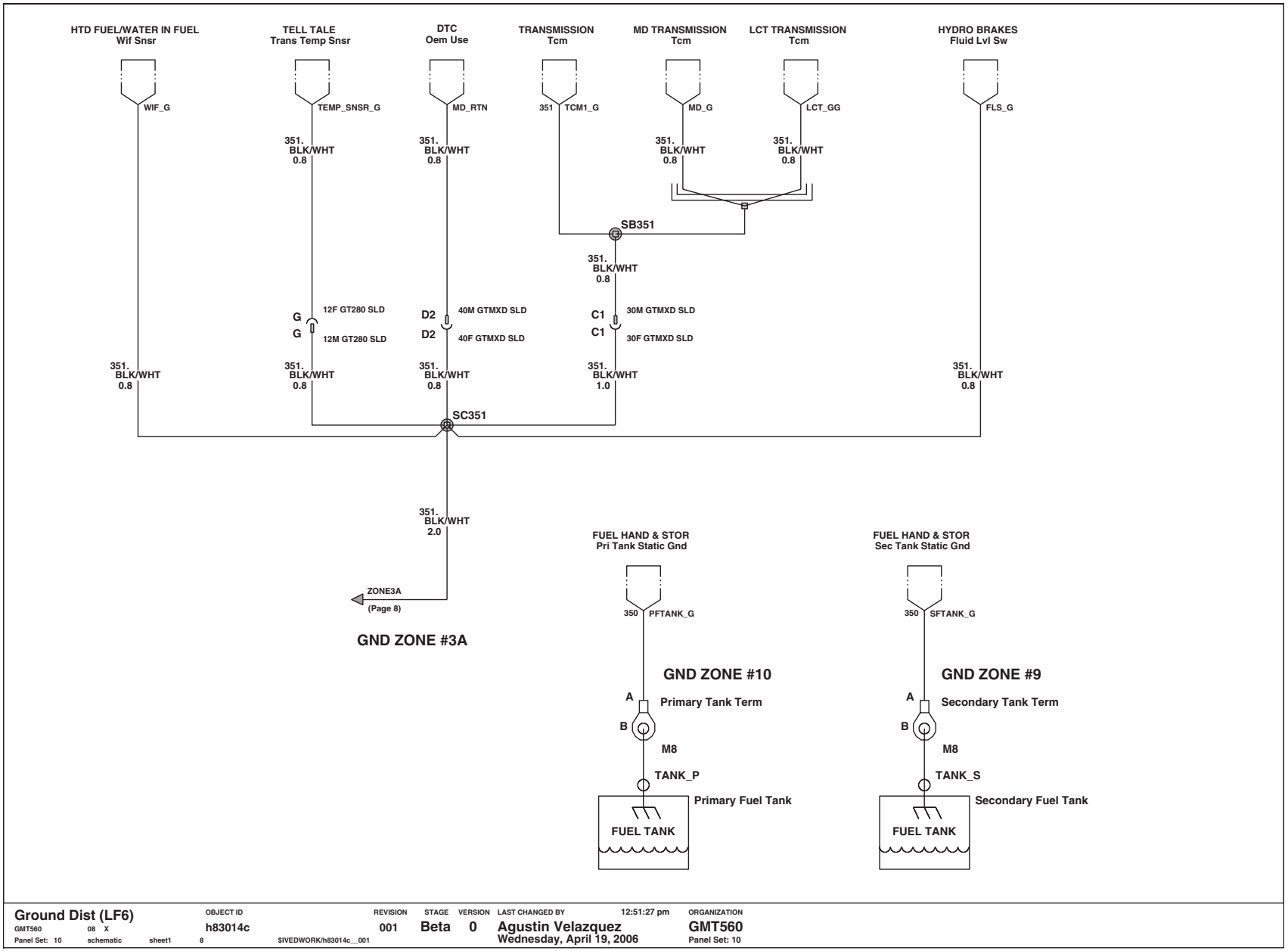
Ground Dist (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83014c	001	Beta	0	Agustin Velazquez	12:51:27 pm	GMT560
Panel Set: 8 schematic sheet1 8	$IVEDWORK/h83014c__001				Wednesday, April 19, 2006		Panel Set: 8

Ground Distribution (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



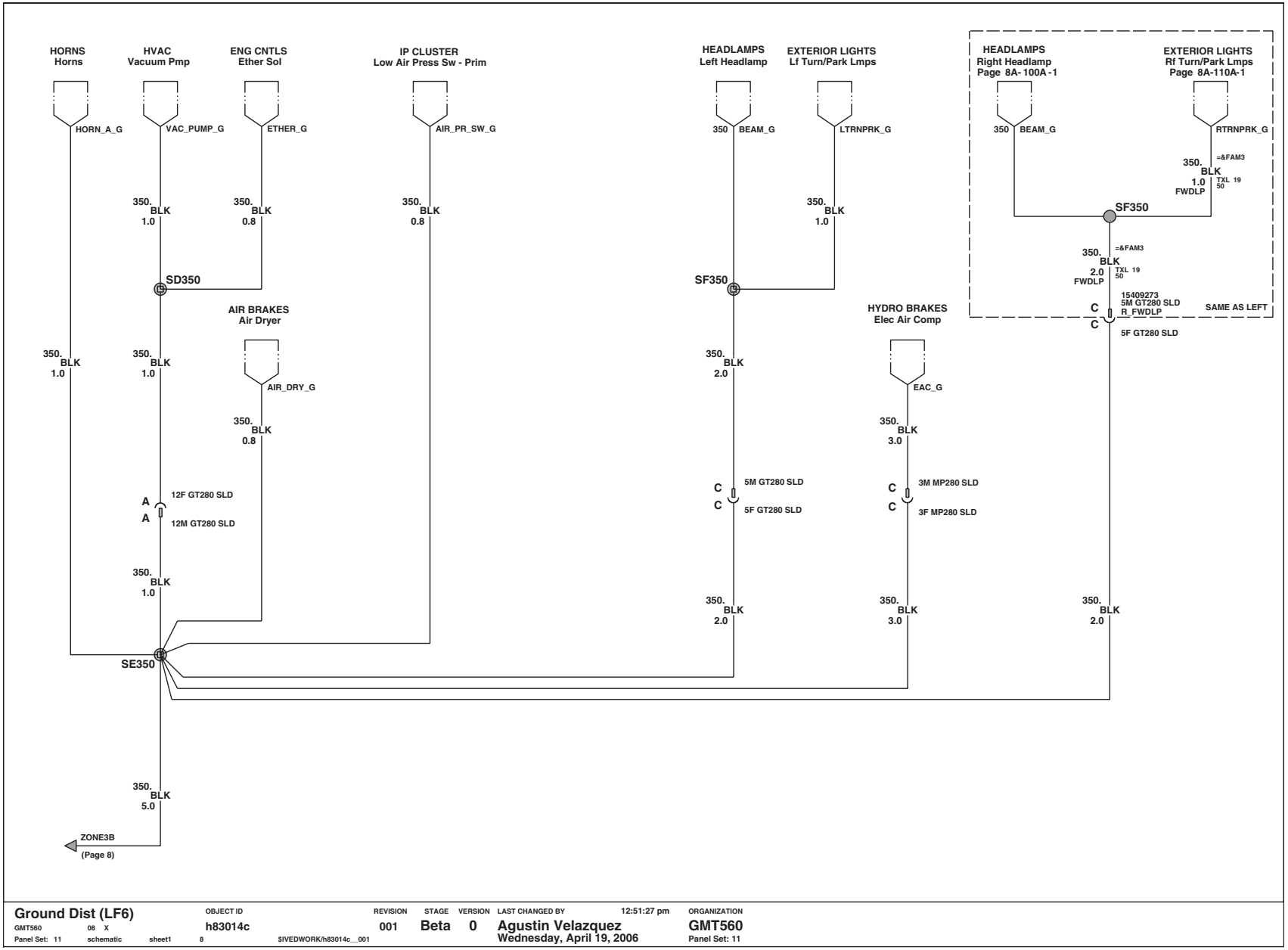
Ground Dist (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:51:27 pm	ORGANIZATION
GMT560 08 X	h83014c	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 9 schematic sheet1 8	$IVEDWORK/h83014c__001				Wednesday, April 19, 2006		Panel Set: 9

Ground Distribution (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



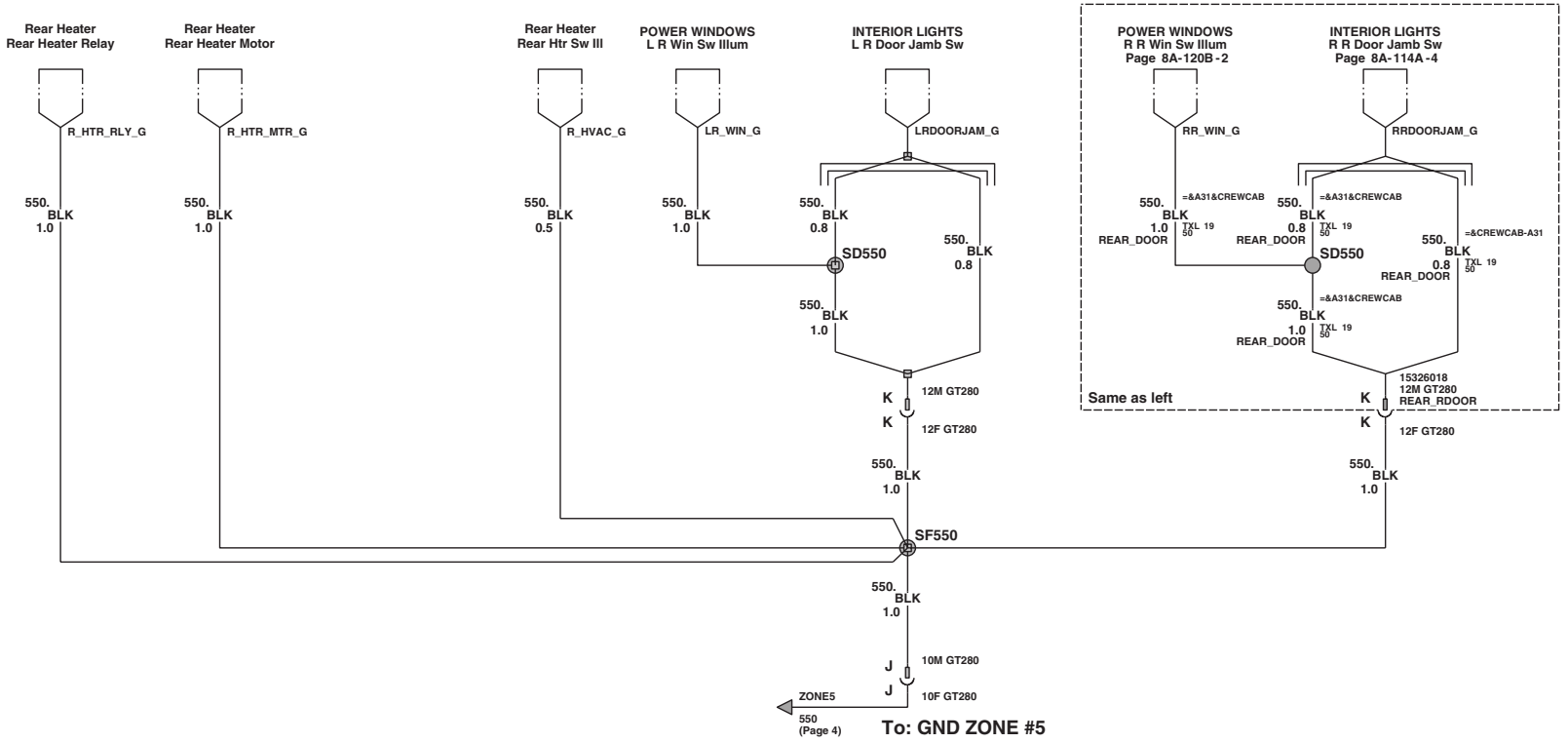
Ground Dist (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83014c	001	Beta	0	Agustin Velazquez	12:51:27 pm	GMT560
Panel Set: 10 schematic sheet1 8	$IVEDWORK/h83014c__001				Wednesday, April 19, 2006		Panel Set: 10

Ground Distribution (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



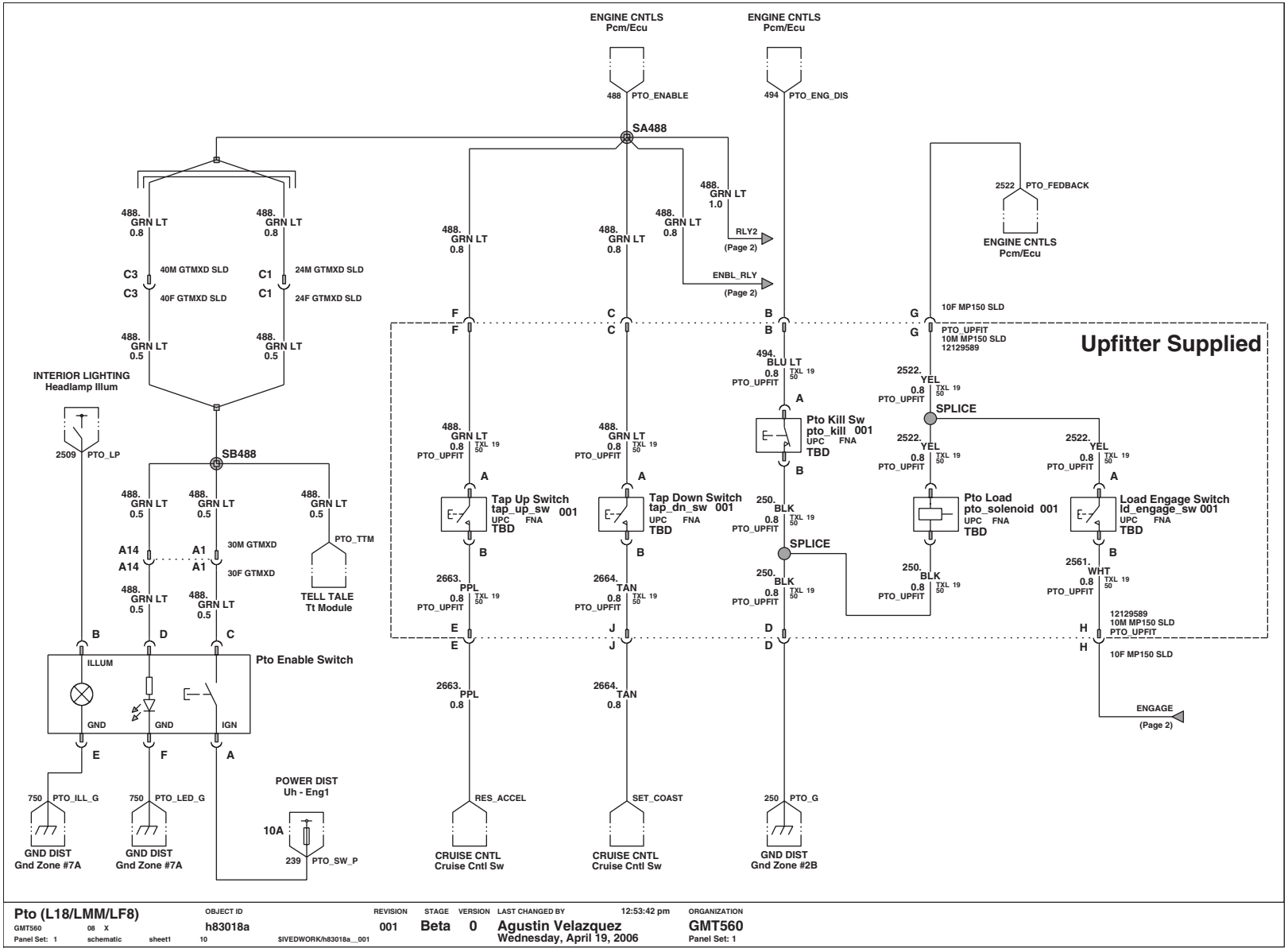
Ground Dist (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	12:51:27 pm	ORGANIZATION
GMT560 08 X	h83014c	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 11 schematic sheet1 8	$IVEDWORK/h83014c__001				Wednesday, April 19, 2006		Panel Set: 11

Ground Distribution (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)

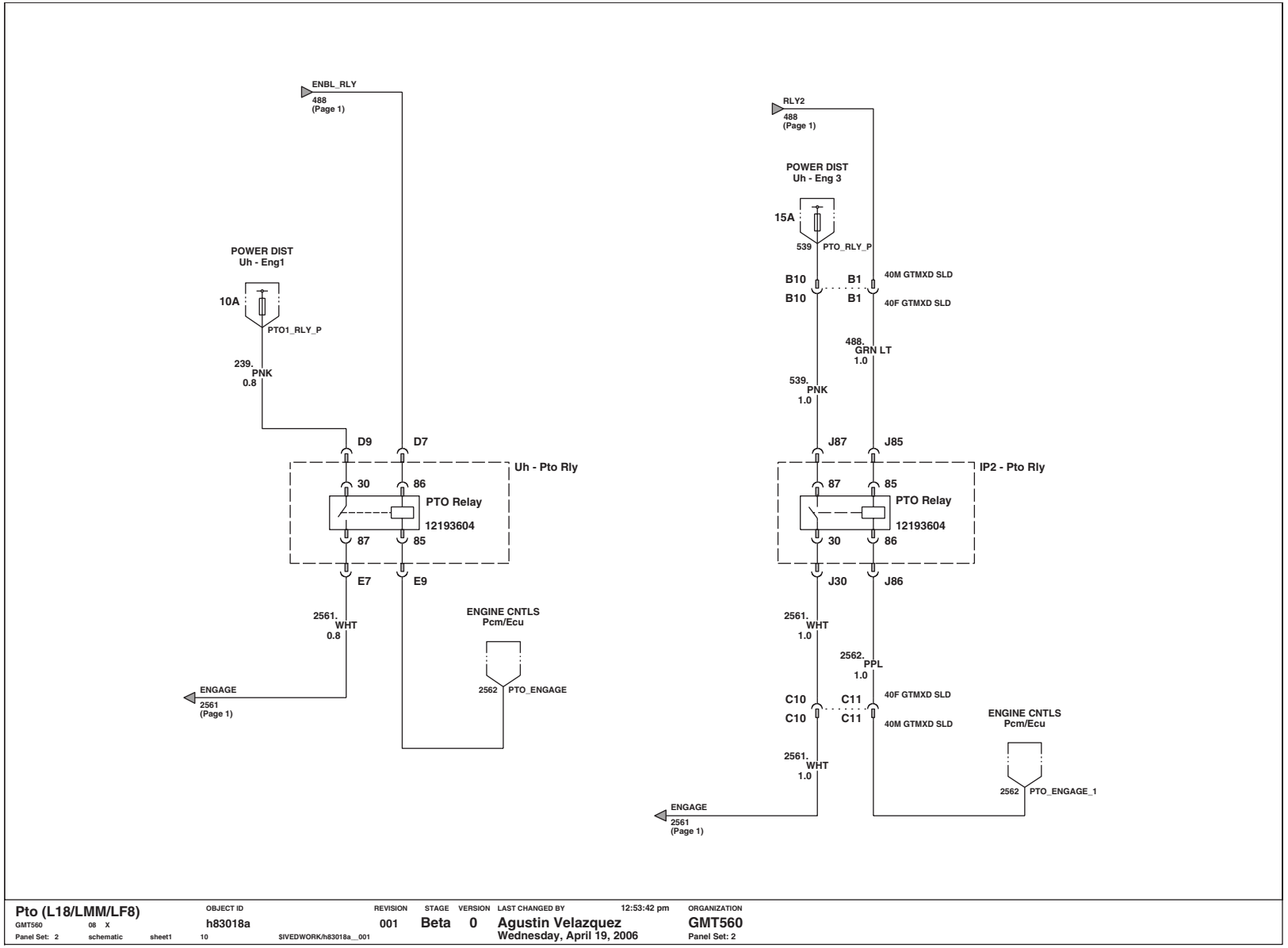


Ground Dist (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83014c	001	Beta	0	Agustin Velazquez	12:51:27 pm	GMT560
Panel Set: 12 schematic sheet1 8	$IVEDWORK/h83014c__001				Wednesday, April 19, 2006		Panel Set: 12

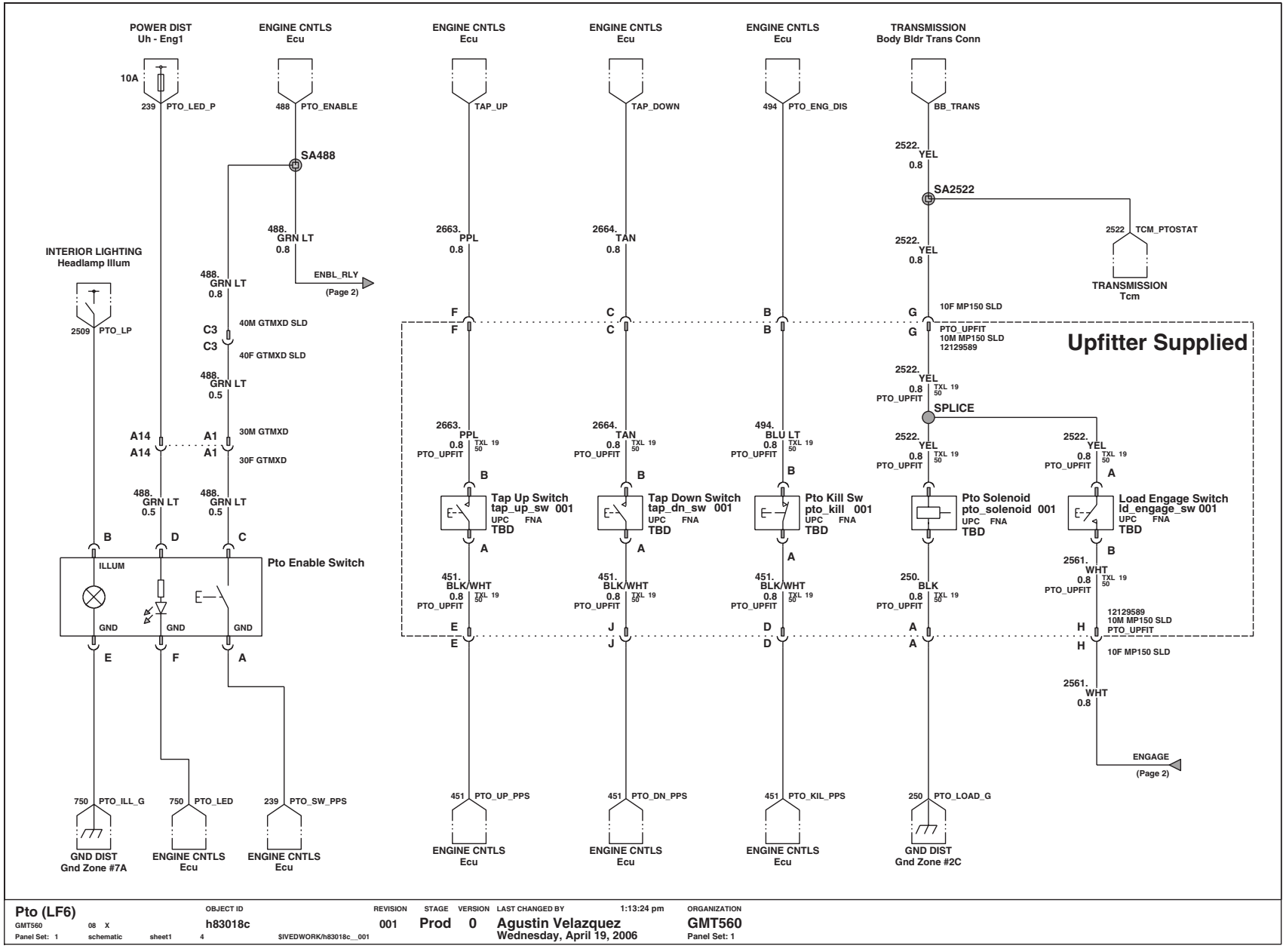
Power Take-Off (L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel – (LF8) 7.8L L6 Isuzu 6H - Diesel



Power Take-Off (L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel – (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)

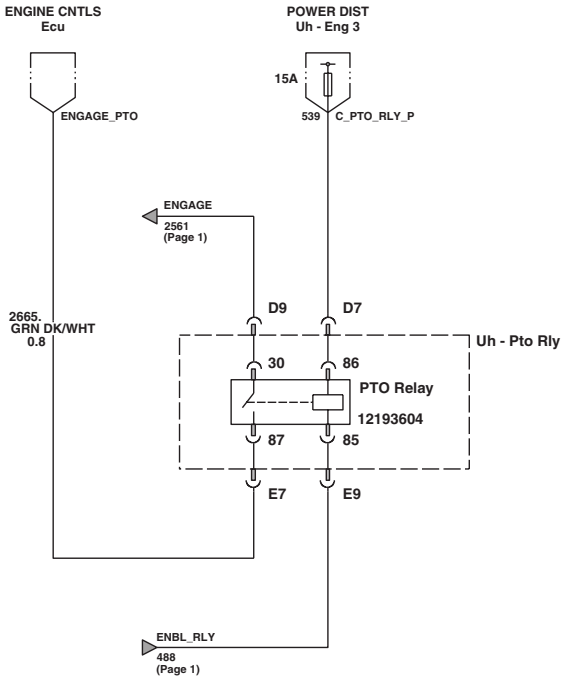


Power Take-Off (LF6) 7.2L L6 Caterpillar® C7 - Diesel



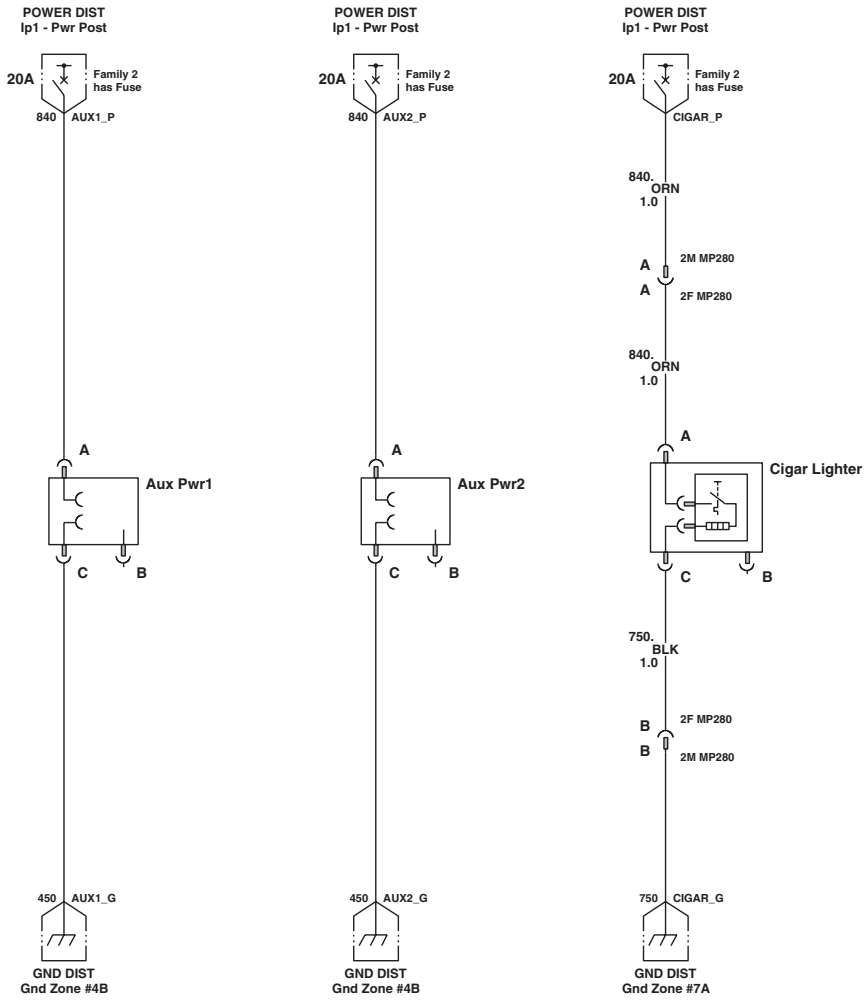
Pto (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83018c	001	Prod	0	Agustin Velazquez	1:13:24 pm	GMT560
Panel Set: 1 schematic sheet1 4	$IVEDWORK/h83018c__001				Wednesday, April 19, 2006		Panel Set: 1

Power Take-Off (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



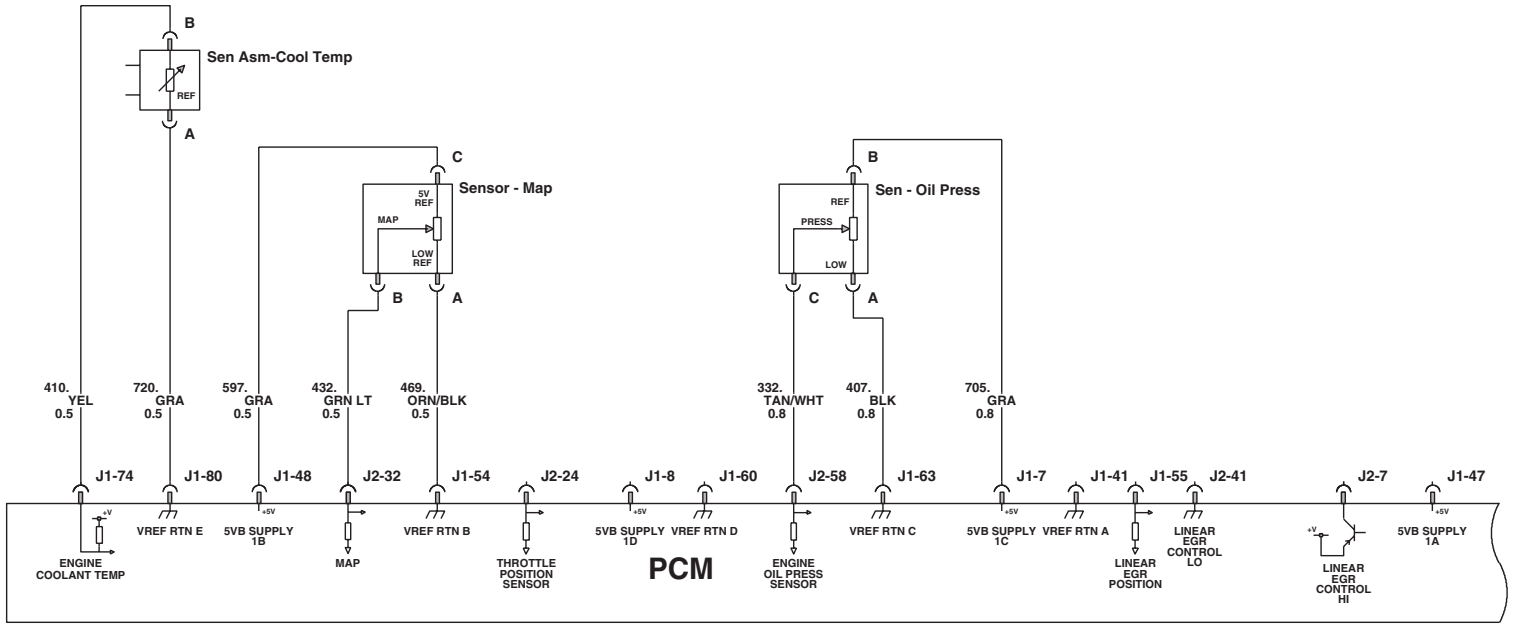
Pto (LF6)		OBJECT ID		REVISION	STAGE	VERSION	LAST CHANGED BY	1:13:24 pm	ORGANIZATION
GMT560	08 X	h83018c		001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 2	schematic sheet1 4	$IVEDWORK/h83018c__001					Wednesday, April 19, 2006		Panel Set: 2

Auxiliary Power



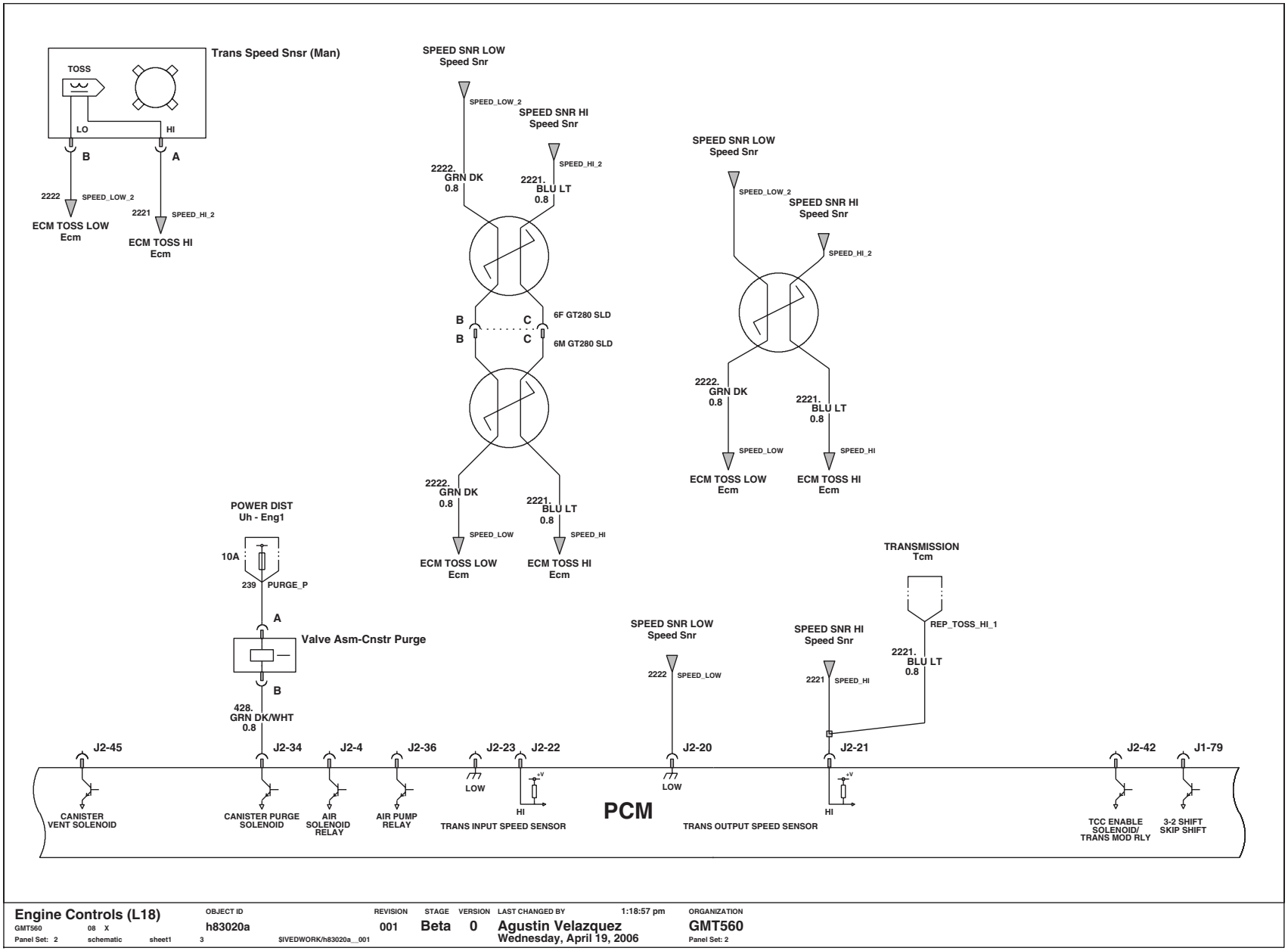
Auxiliary Power	OBJECT ID		REVISION	STAGE	VERSION	LAST CHANGED BY	1:17:48 pm	ORGANIZATION
GMT560 08 X	h83019a		001	Pilot	B	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 2	$IVEDWORK/h83019a__001					Wednesday, April 19, 2006		Panel Set: 1

Engine Controls (L18) 8.1L V8 GMPT VORTEC® - Gas



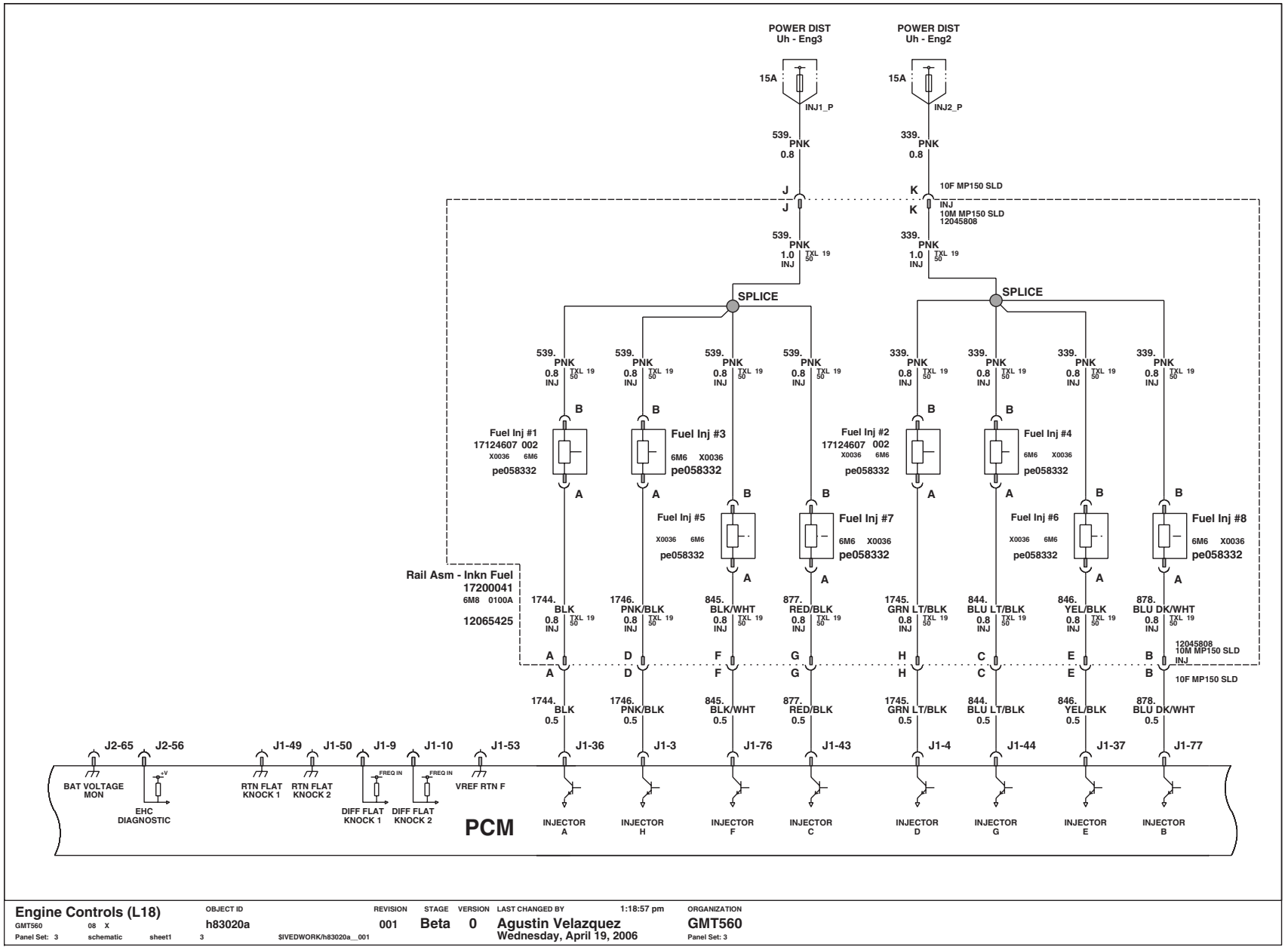
Engine Controls (L18)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:18:57 pm	ORGANIZATION
GMT560 08 X	h83020a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83020a__001				Wednesday, April 19, 2006		Panel Set: 1

Engine Controls (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)

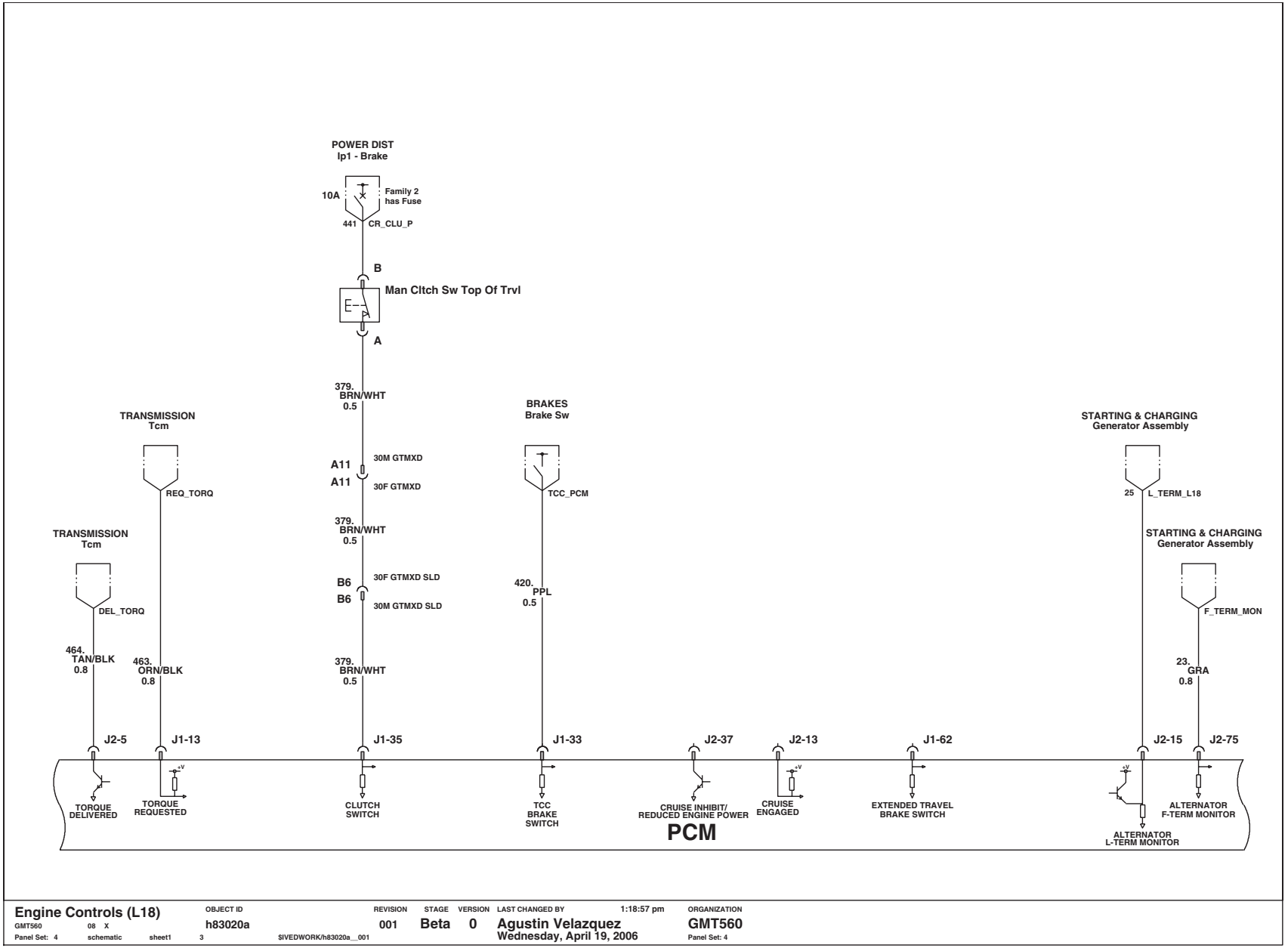


Engine Controls (L18)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83020a	001	Beta	0	Agustin Velazquez	1:18:57 pm	GMT560
Panel Set: 2 schematic sheet1 3	SIVEDWORK/h83020a__001				Wednesday, April 19, 2006		Panel Set: 2

Engine Controls (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)

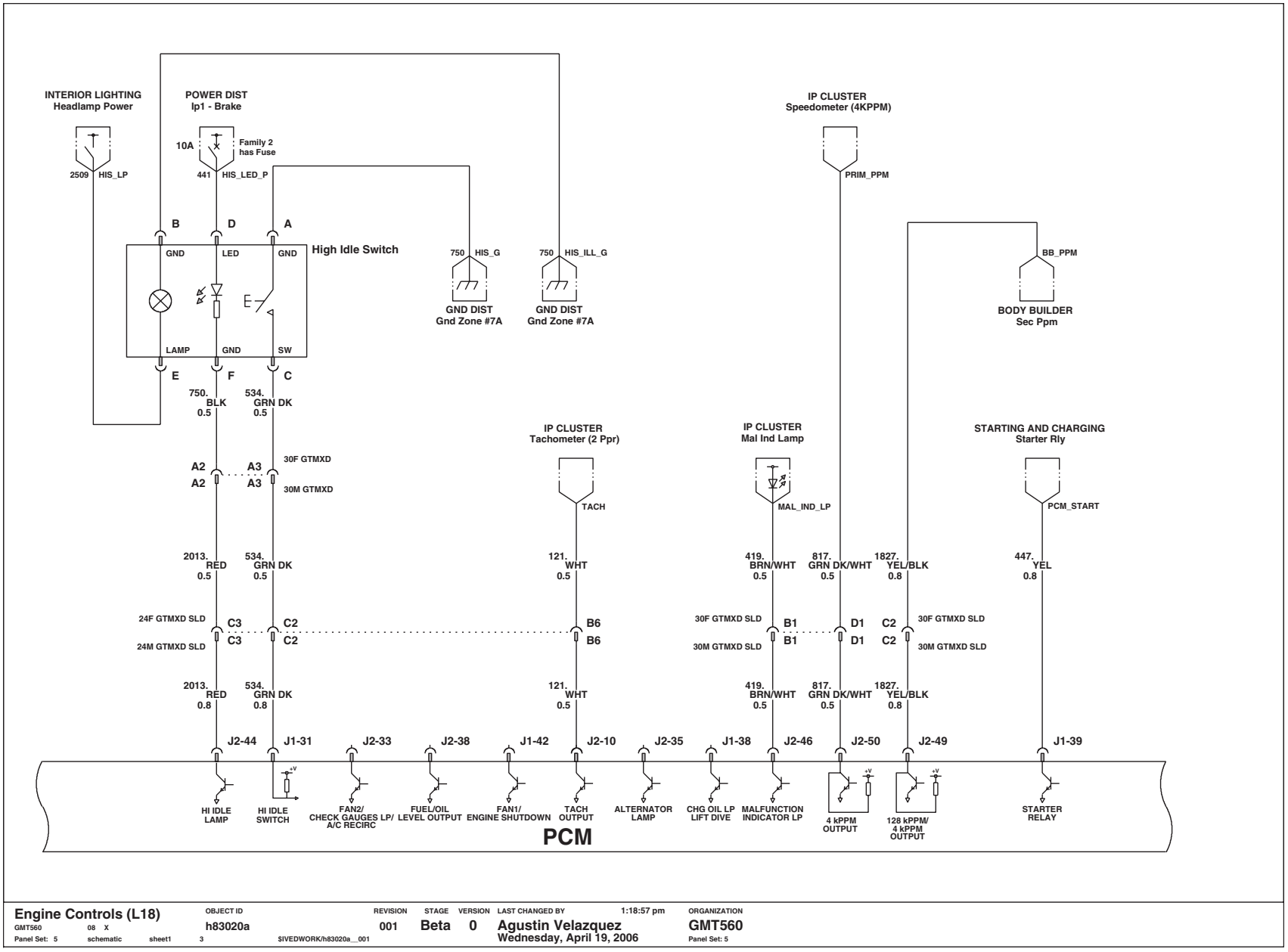


Engine Controls (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)



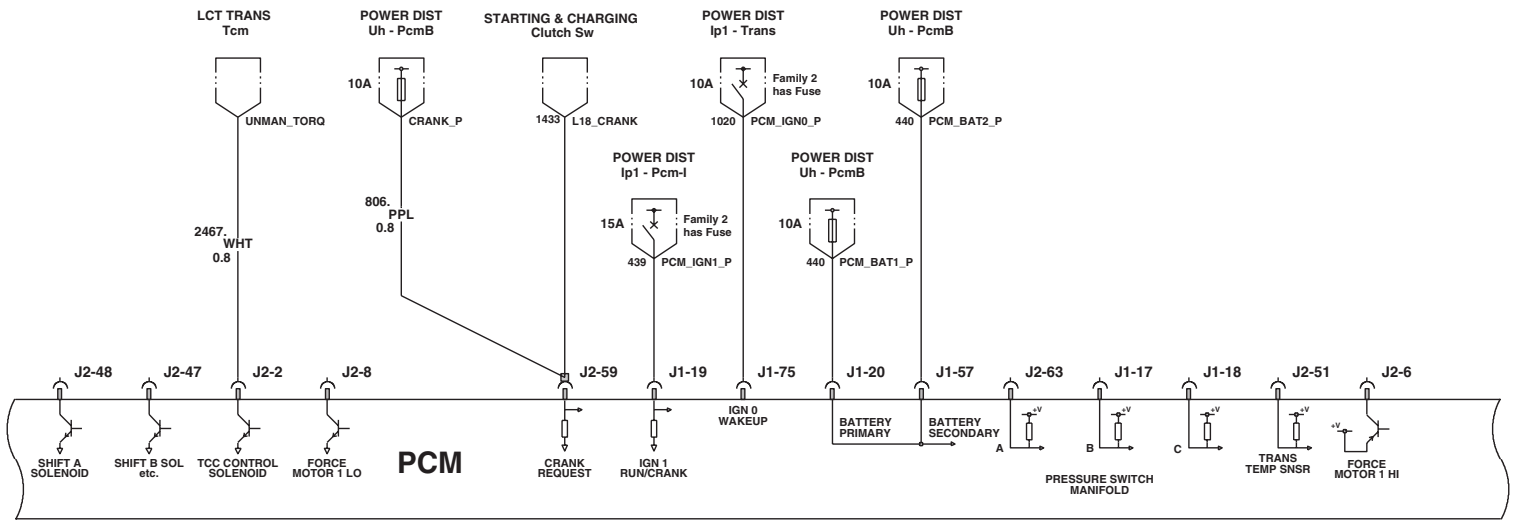
Engine Controls (L18)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:18:57 pm	ORGANIZATION
GMT560 08 X	h83020a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 4 schematic sheet1 3	$IVEDWORK/h83020a__001				Wednesday, April 19, 2006		Panel Set: 4

Engine Controls (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)



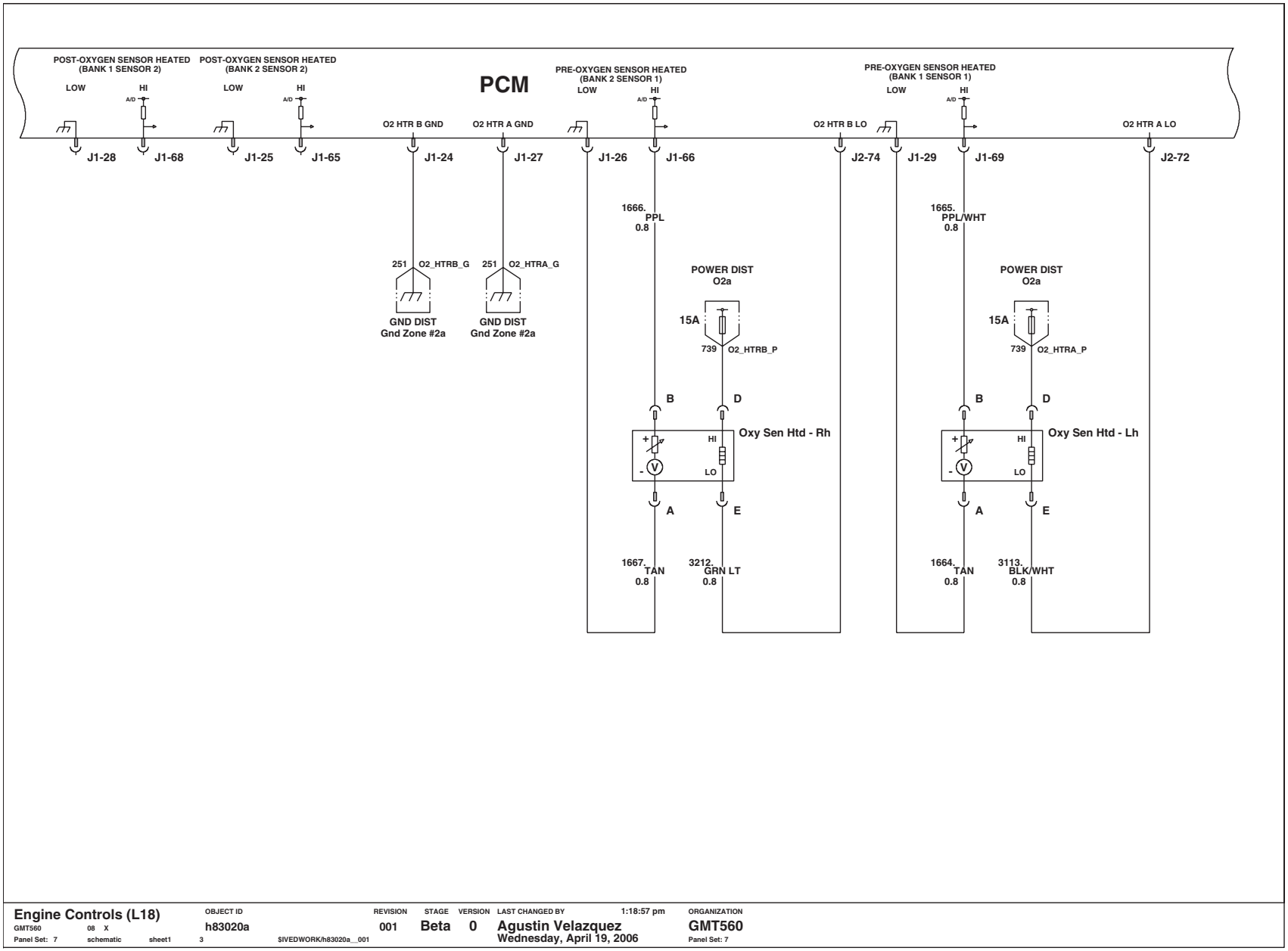
Engine Controls (L18)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83020a	001	Beta	0	Agustin Velazquez	1:18:57 pm	GMT560
Panel Set: 5 schematic sheet1 3	$IVEDWORK/h83020a__001				Wednesday, April 19, 2006		Panel Set: 5

Engine Controls (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)



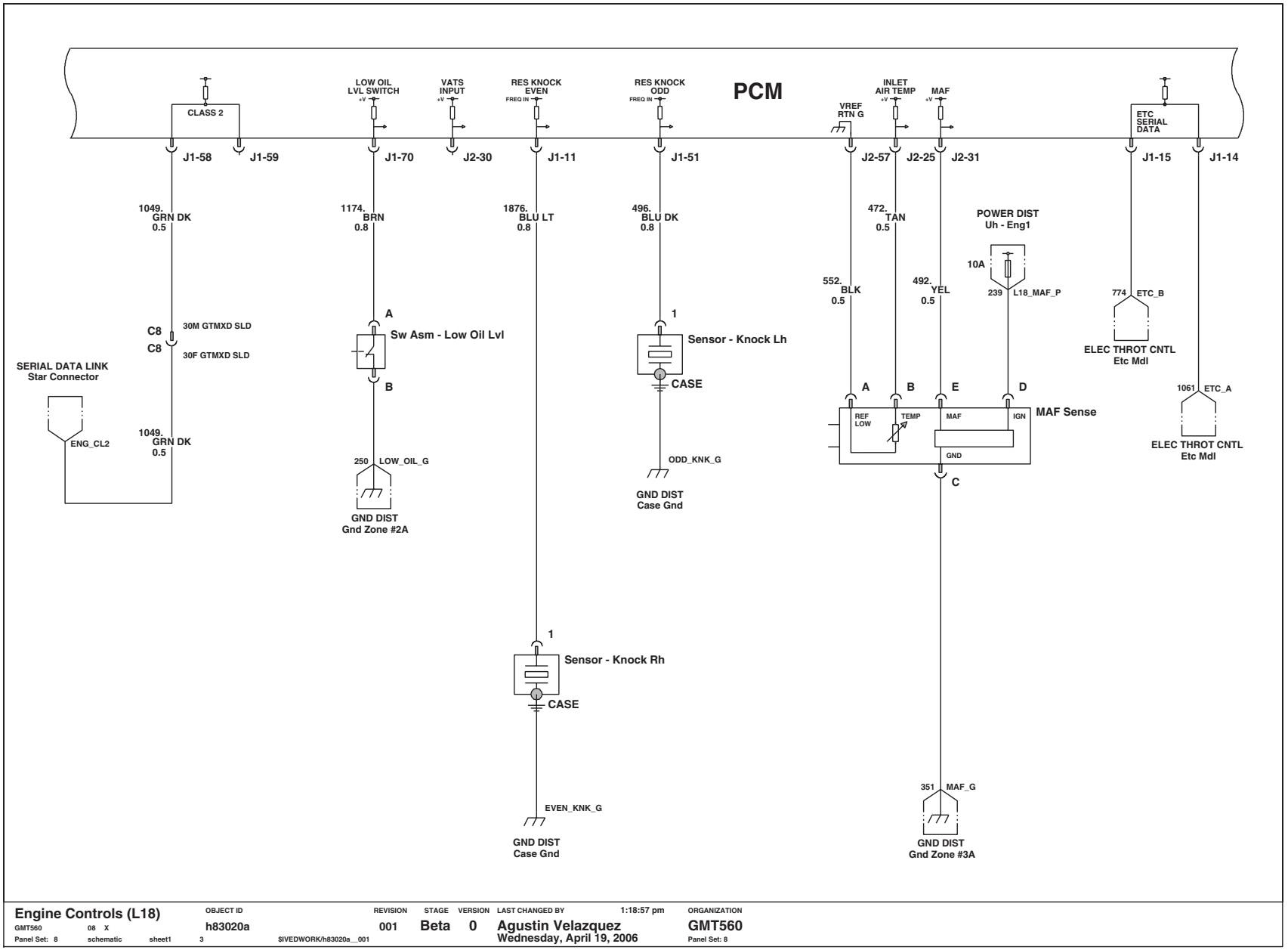
Engine Controls (L18)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:18:57 pm	ORGANIZATION
GMT560 08 X	h83020a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 6 schematic sheet1 3	$IVEDWORK/h83020a__001				Wednesday, April 19, 2006		Panel Set: 6

Engine Controls (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)



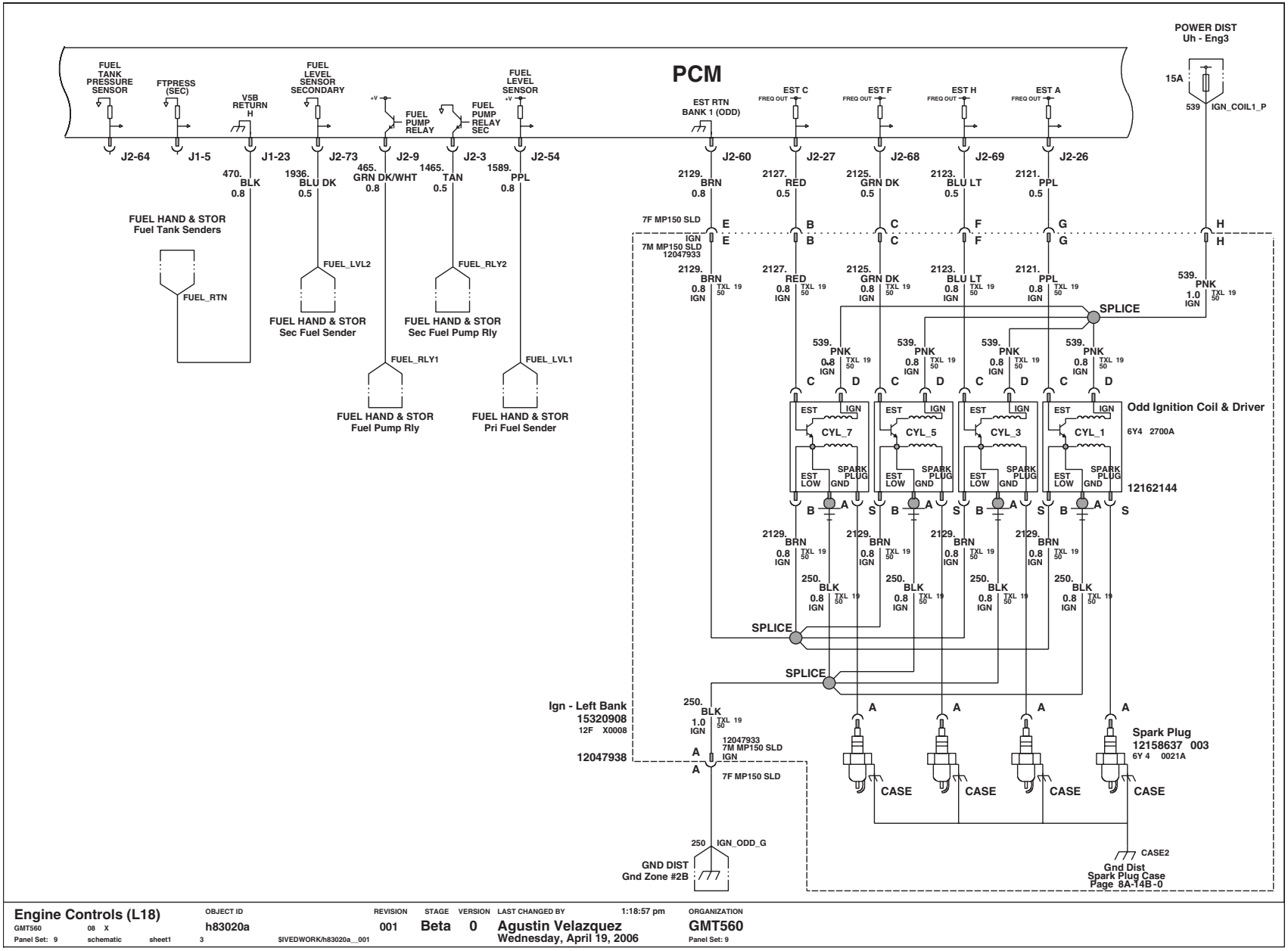
Engine Controls (L18)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83020a	001	Beta	0	Agustin Velazquez	1:18:57 pm	GMT560
Panel Set: 7 schematic sheet1 3	$IVEDWORK/h83020a__001				Wednesday, April 19, 2006		Panel Set: 7

Engine Controls (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)

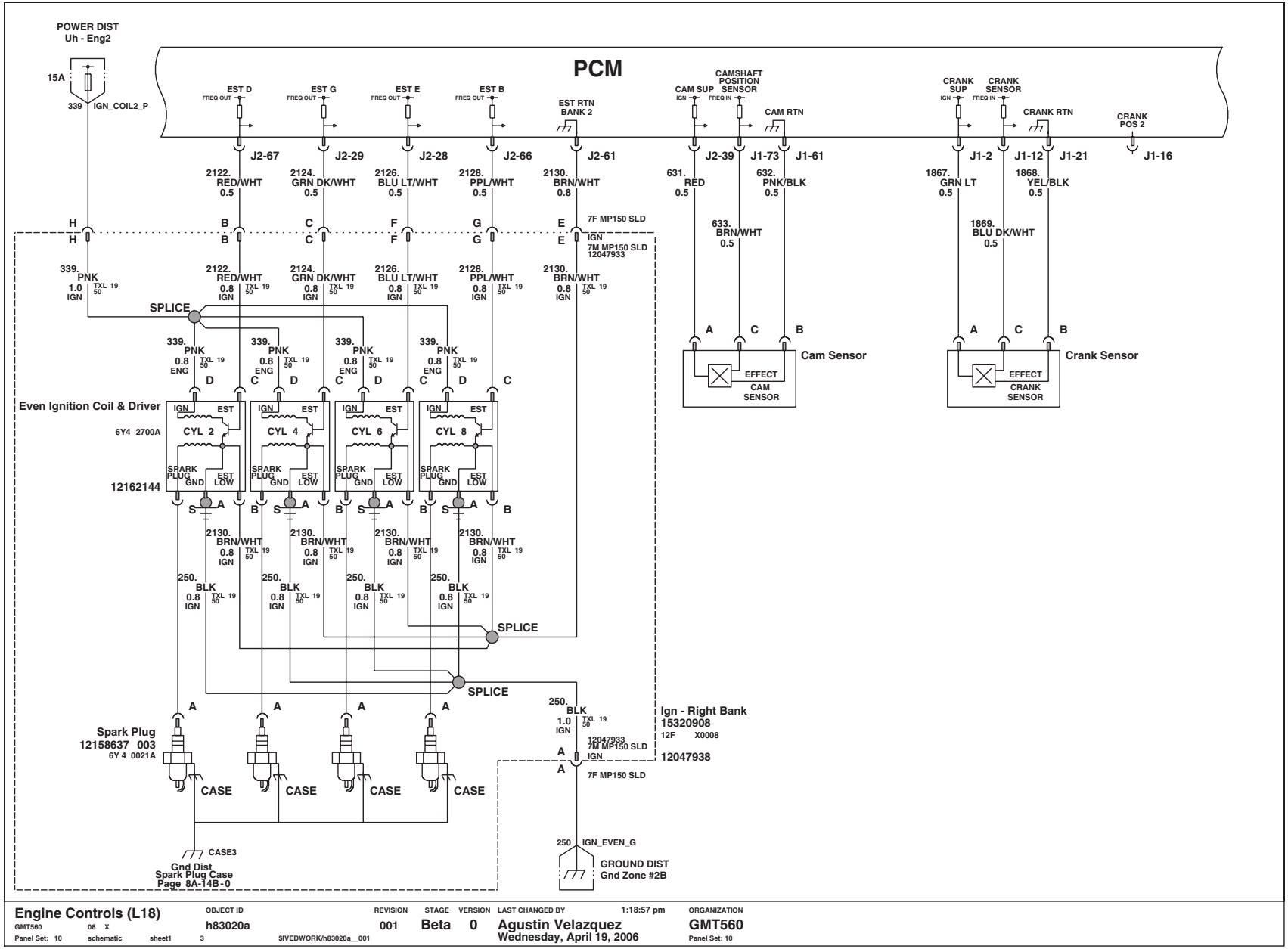


Engine Controls (L18)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:18:57 pm	ORGANIZATION
GMT560 08 X	h83020a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 8 schematic sheet1 3	$IVEDWORK/h83020a__001				Wednesday, April 19, 2006		Panel Set: 8

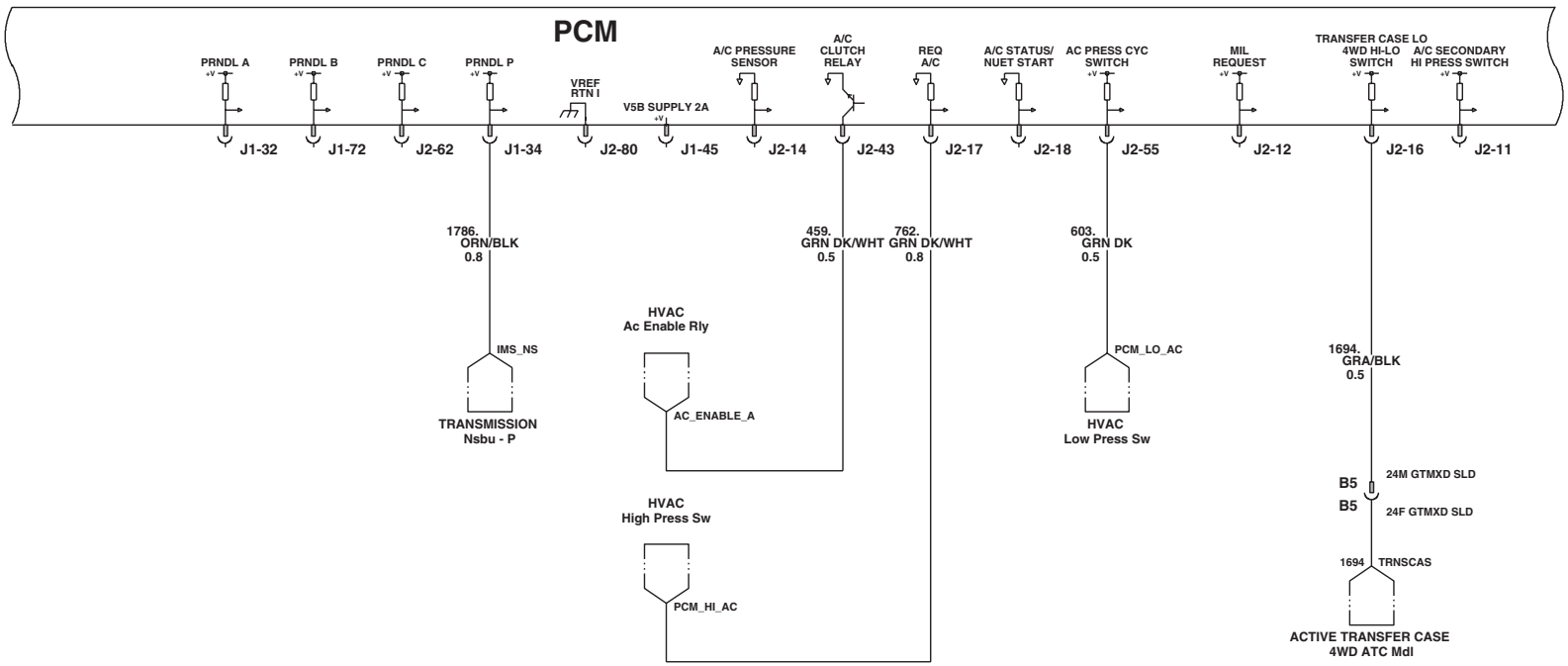
Engine Controls (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)



Engine Controls (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)

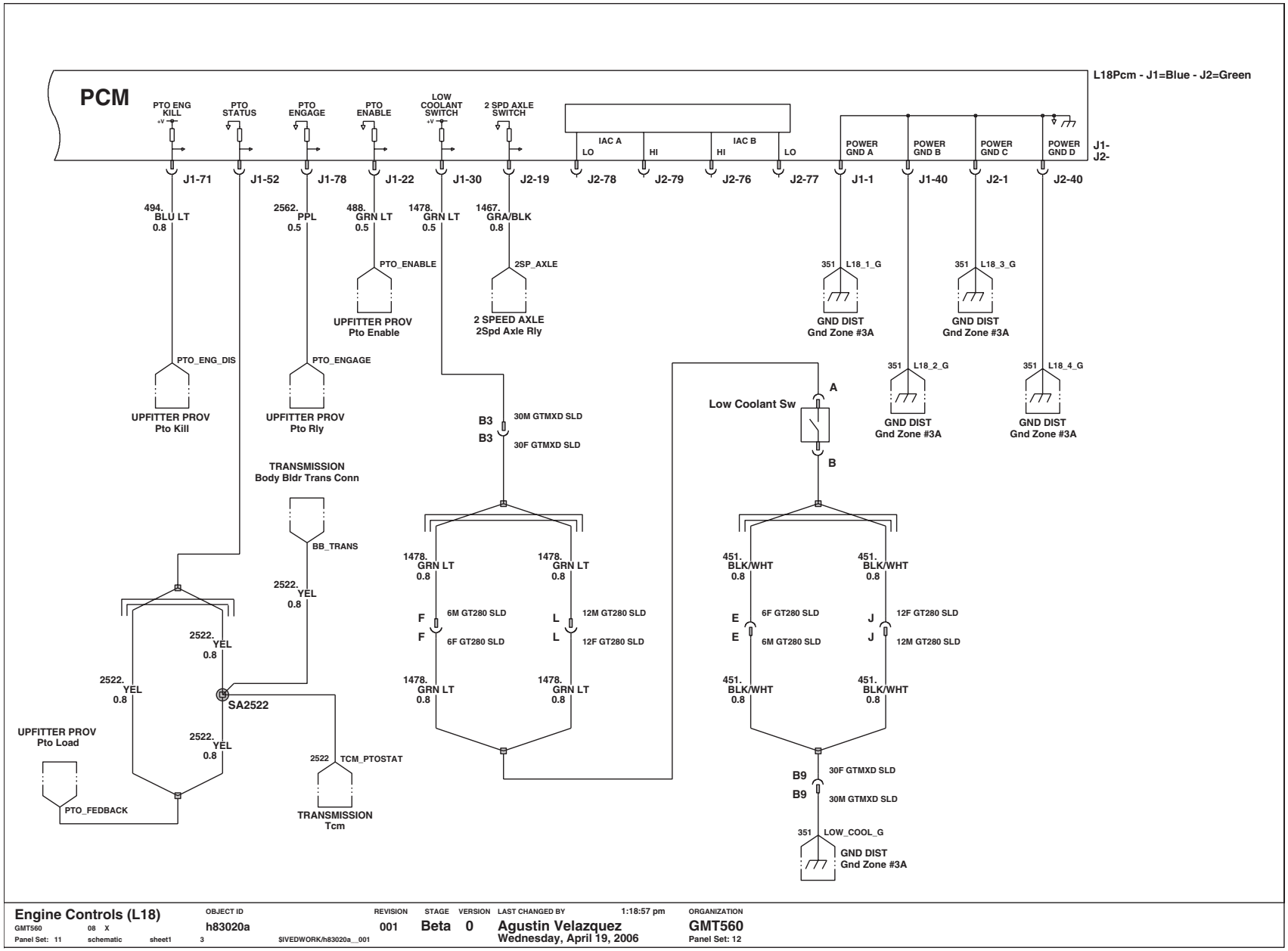


Engine Controls (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)

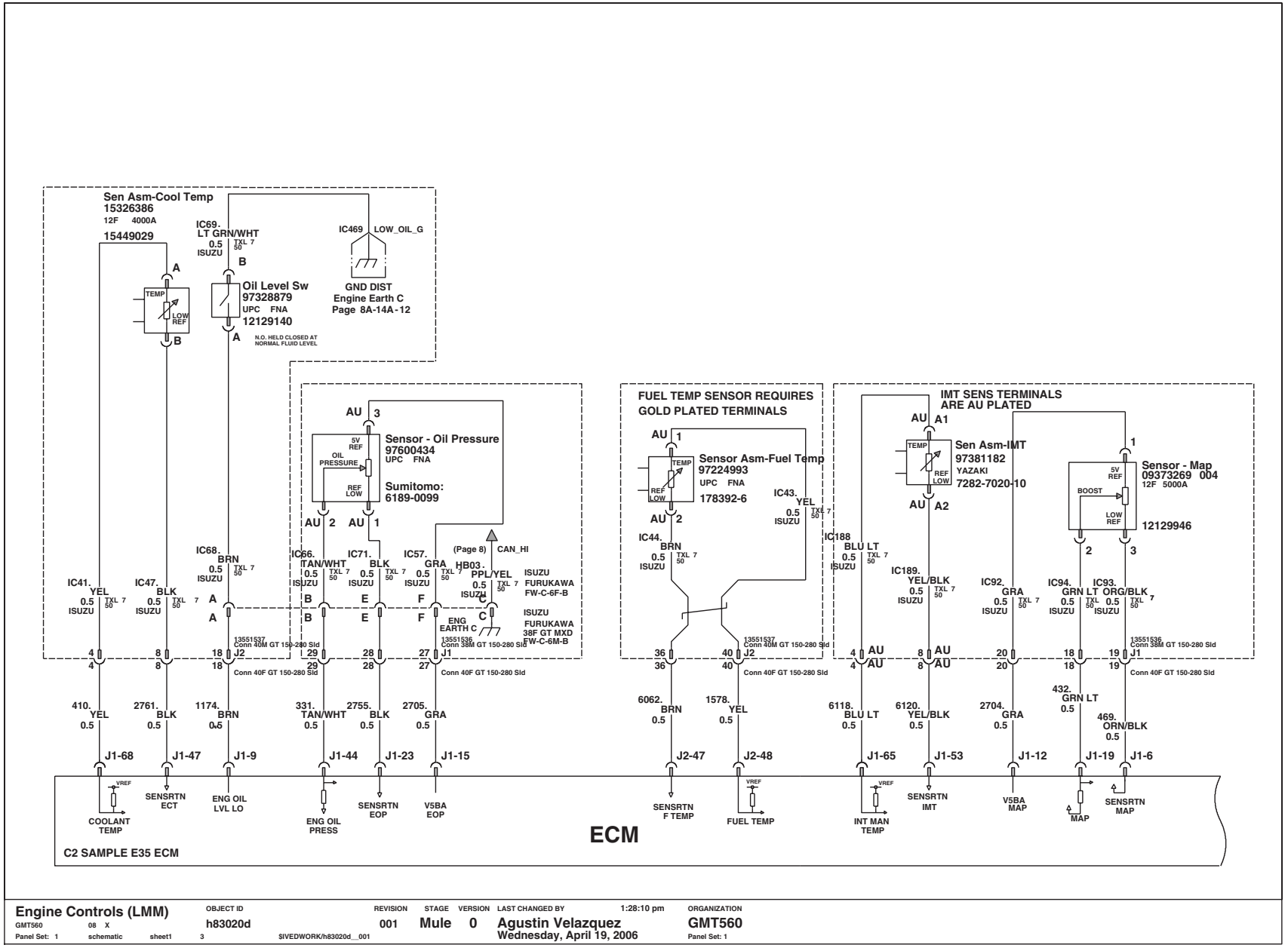


Engine Controls (L18)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83020a	001	Beta	0	Agustin Velazquez	1:18:57 pm	GMT560
Panel Set: 11 schematic sheet1 3	$IVEDWORK/h83020a__001				Wednesday, April 19, 2006		Panel Set: 11

Engine Controls (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)

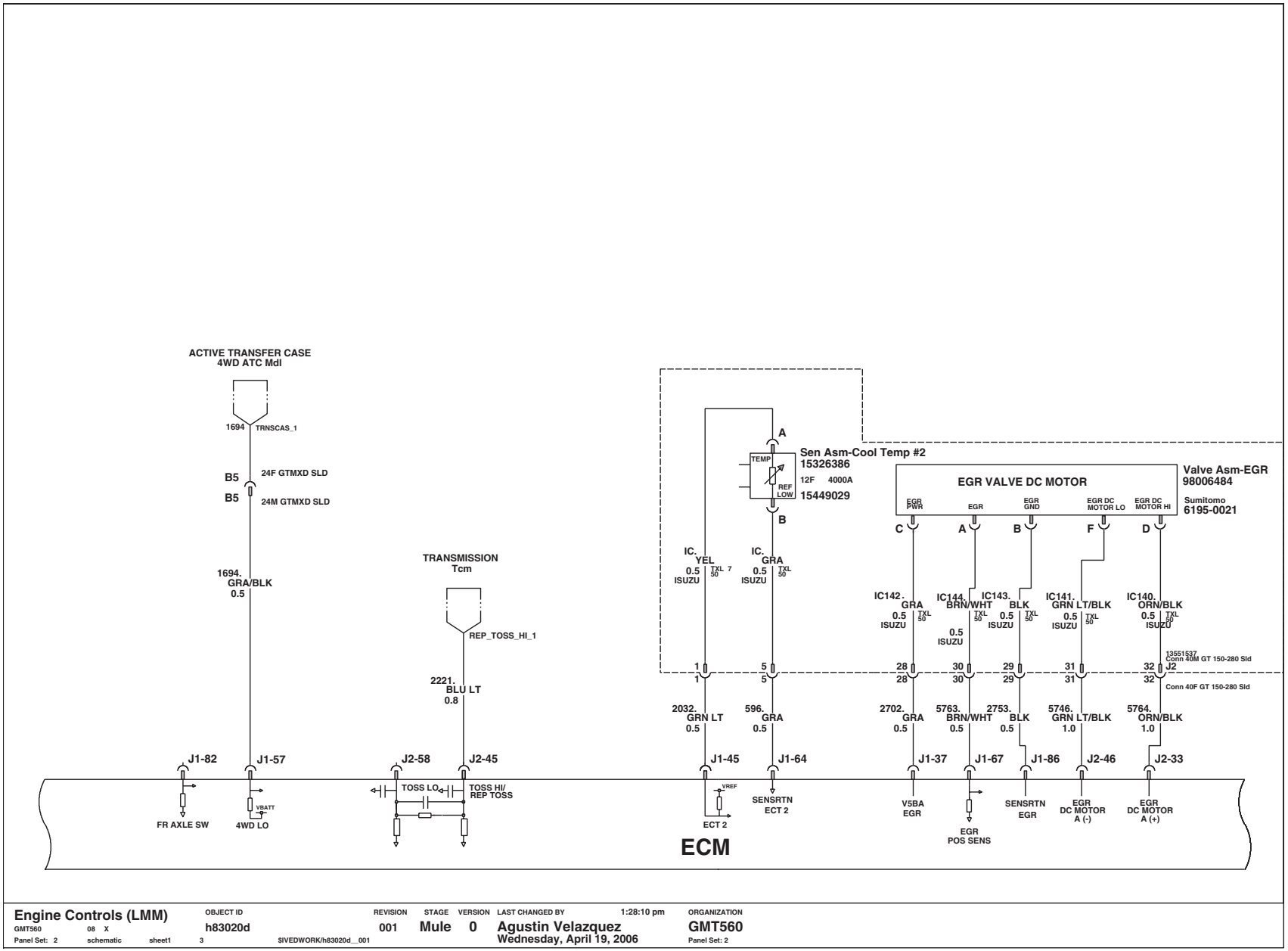


Engine Controls (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel



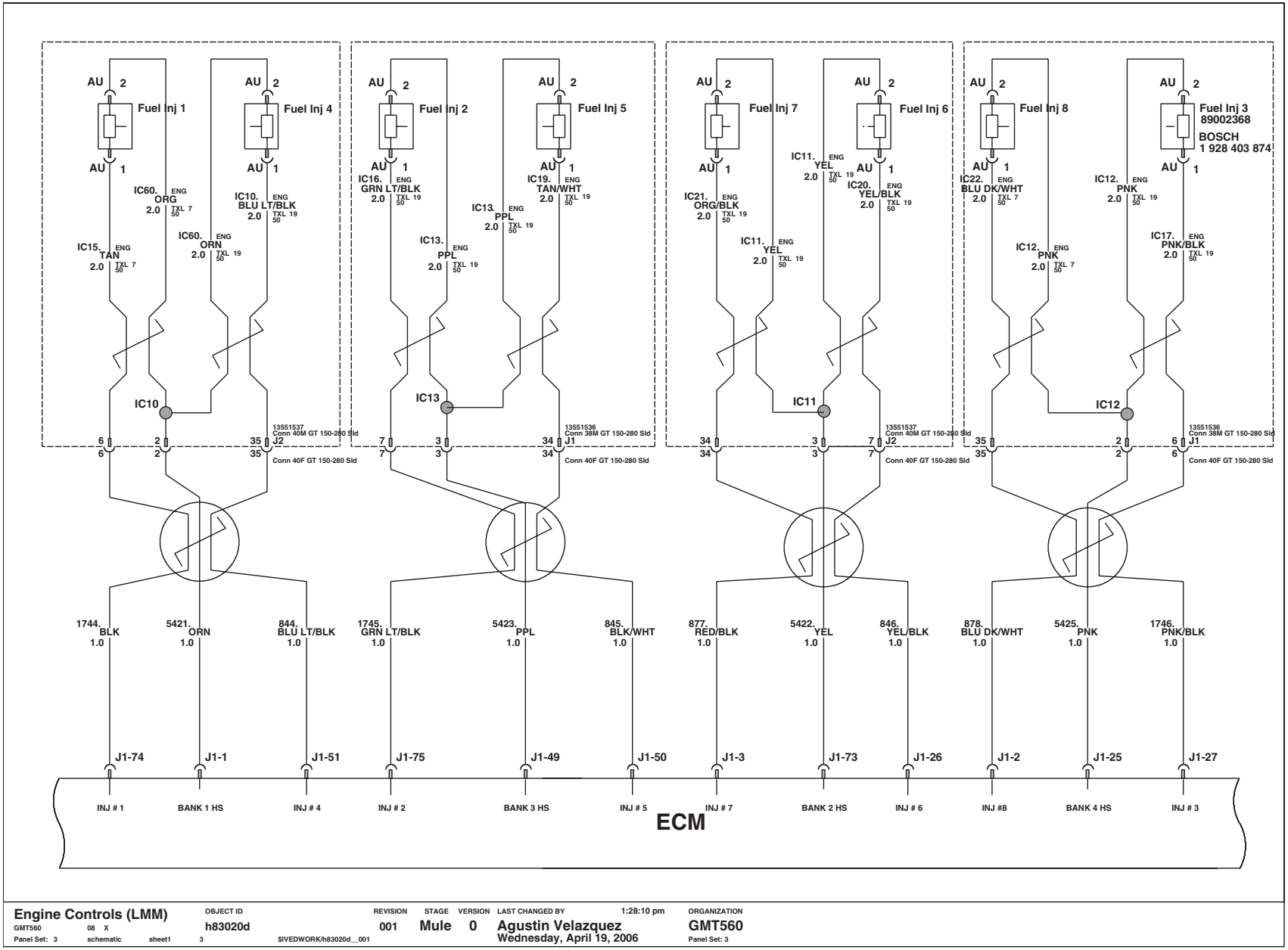
Engine Controls (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83020d	001	Mule	0	Agustin Velazquez	1:28:10 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83020d__001				Wednesday, April 19, 2006		Panel Set: 1

Engine Controls (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



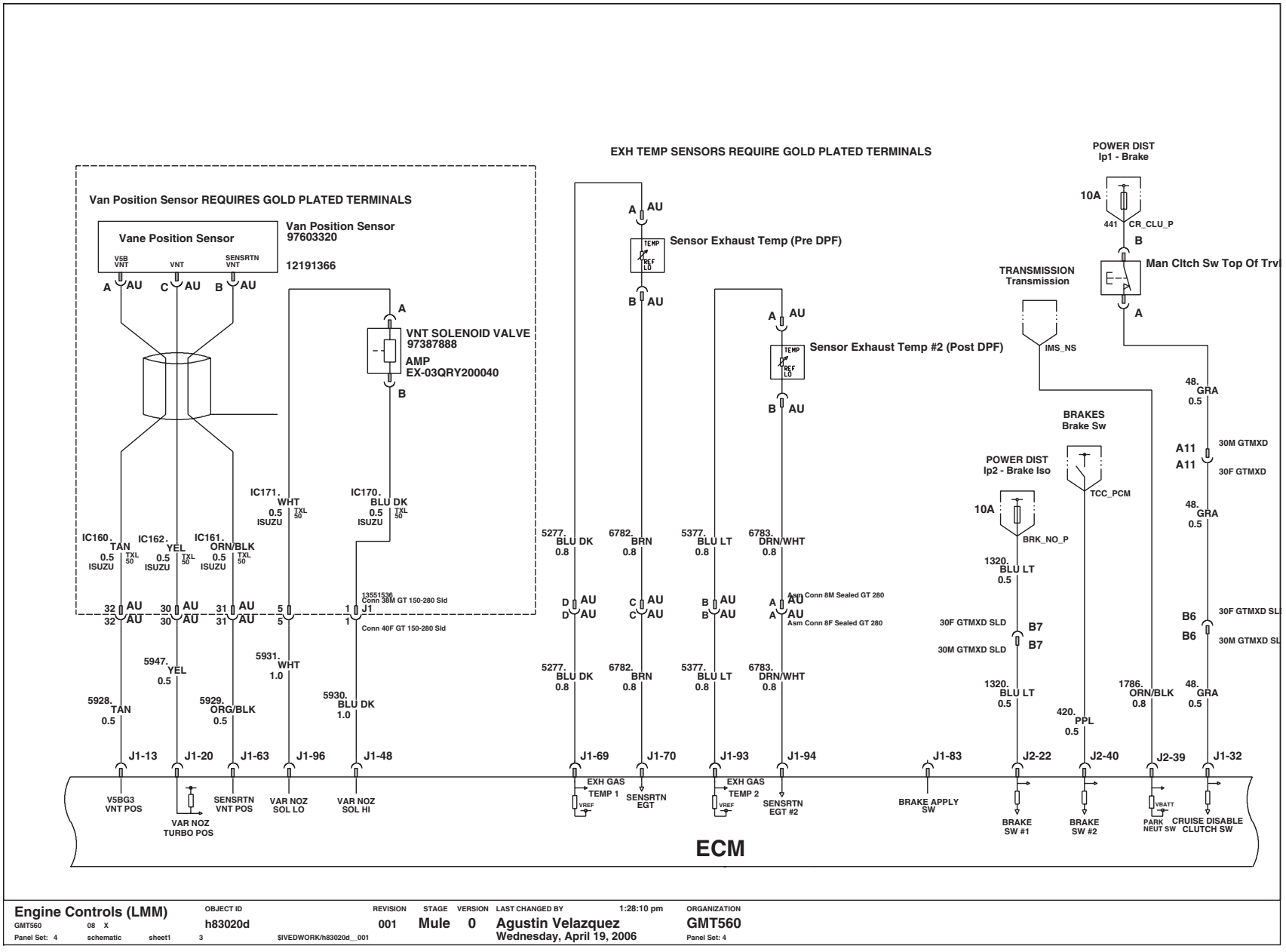
Engine Controls (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:28:10 pm	ORGANIZATION
GMT560 08 X	h83020d	001	Mule	0	Agustin Velazquez		GMT560
Panel Set: 2 schematic sheet1 3	$IVEDWORK/h83020d__001				Wednesday, April 19, 2006		Panel Set: 2

Engine Controls (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



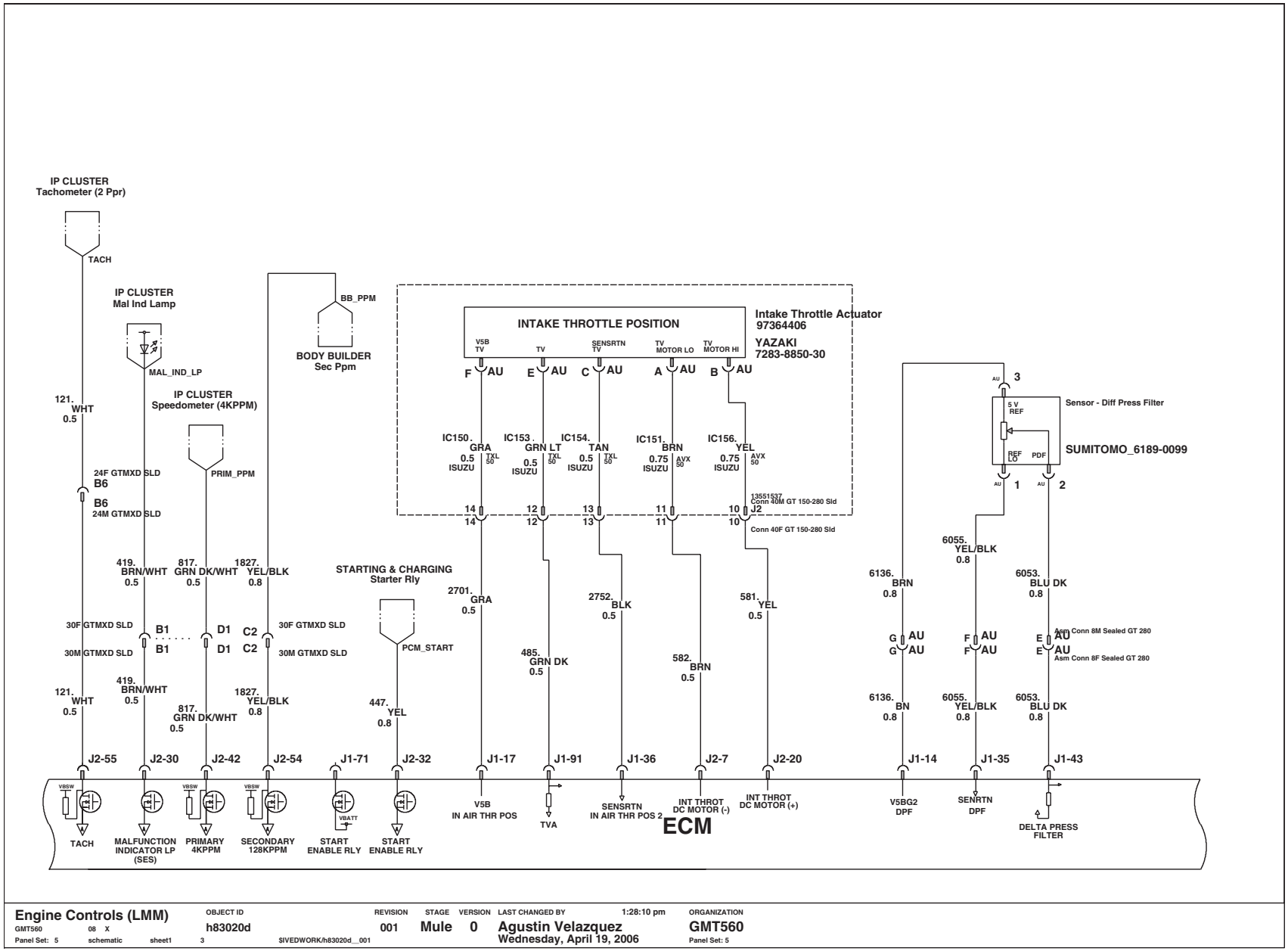
Engine Controls (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:28:10 pm	ORGANIZATION
GMT560 08 X	h83020d	001	Mule	0	Agustin Velazquez		GMT560
Panel Set: 3 schematic sheet1 3	$IVEDWORK/h83020d__001				Wednesday, April 19, 2006		Panel Set: 3

Engine Controls (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



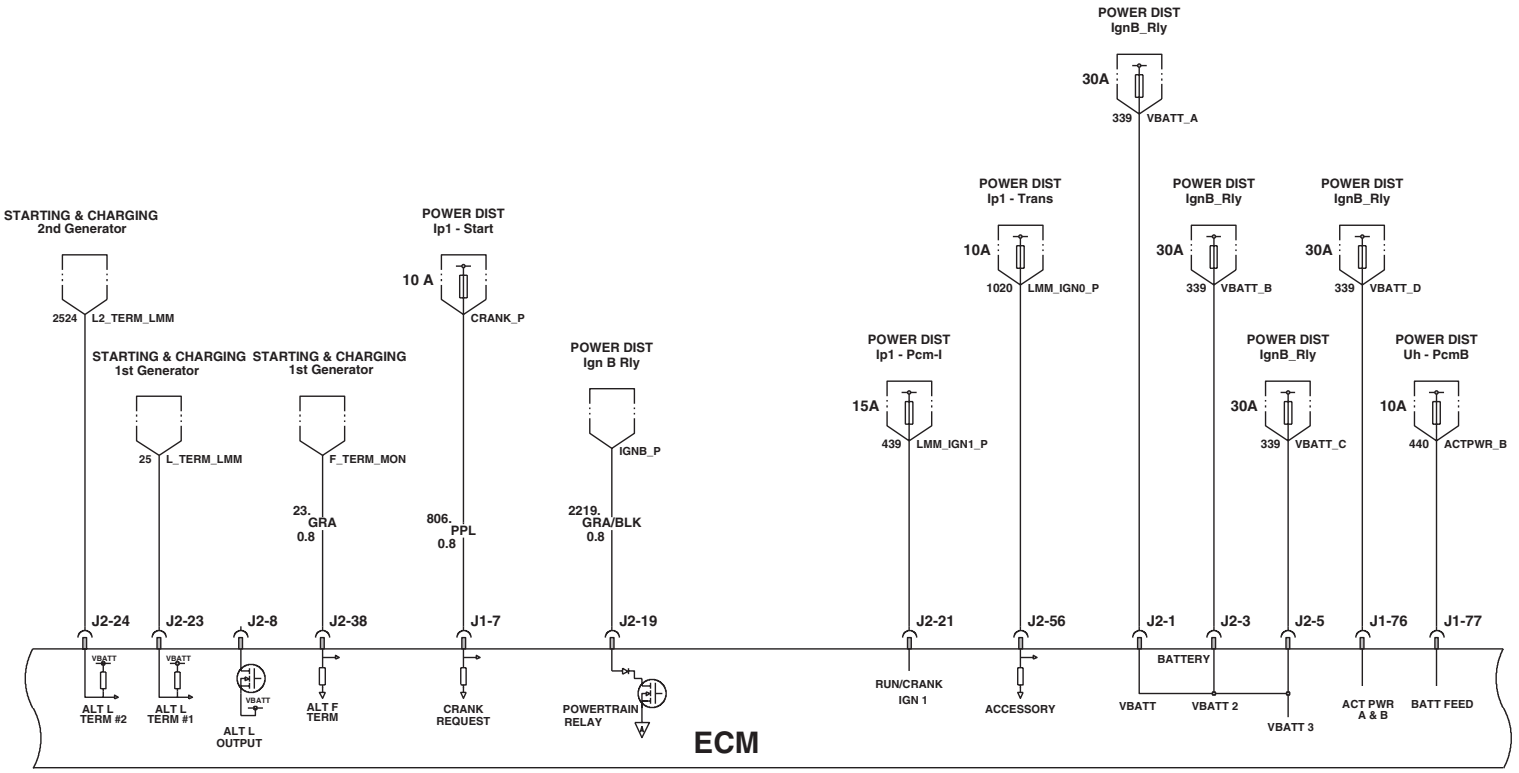
Engine Controls (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83020d	001	Mule	0	Agustin Velazquez	1:28:10 pm	GMT560
Panel Set: 4 schematic sheet1 3	$\VEDWORK/h83020d__001				Wednesday, April 19, 2006		Panel Set: 4

Engine Controls (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



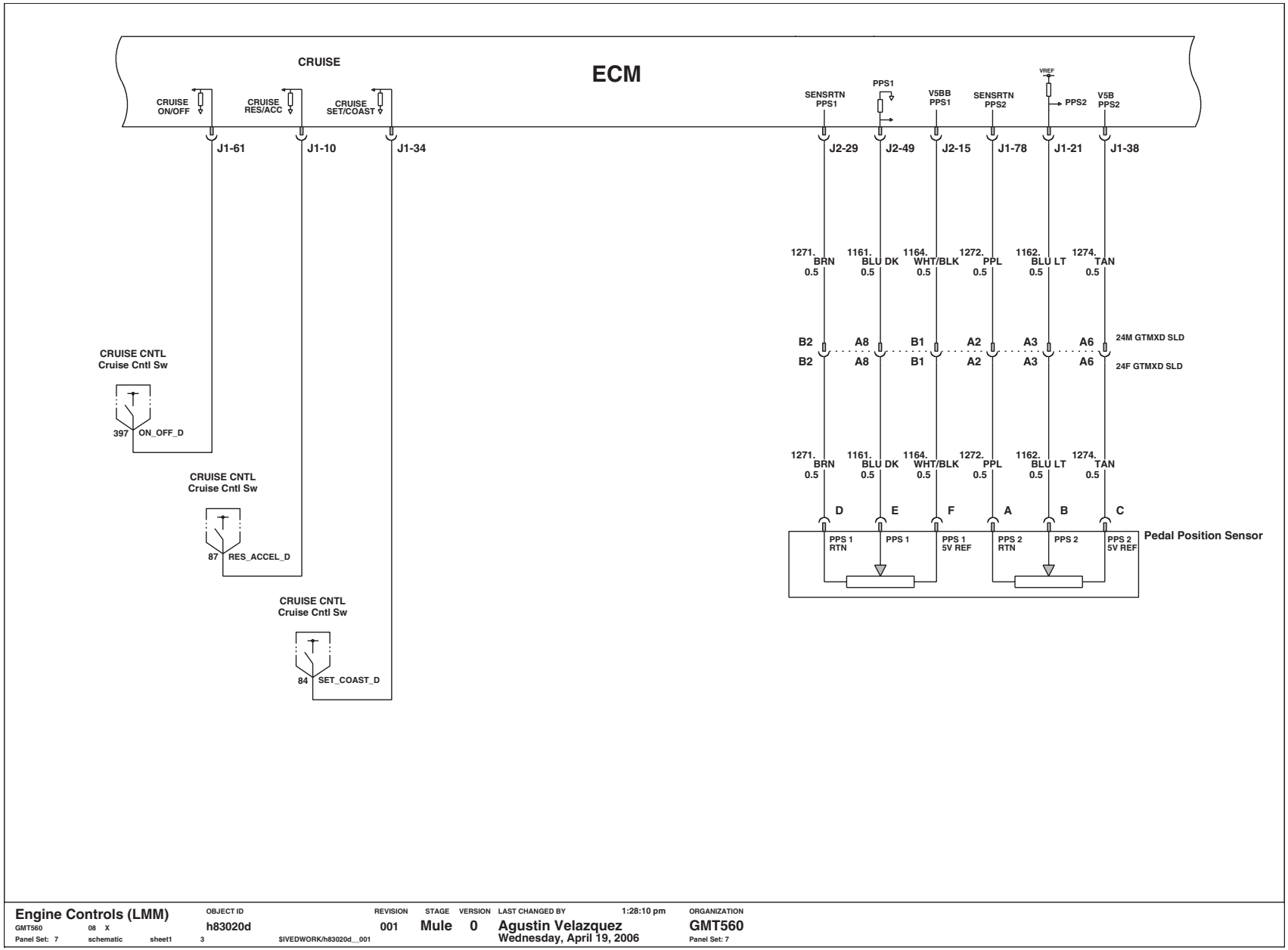
Engine Controls (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83020d	001	Mule	0	Agustin Velazquez	1:28:10 pm	GMT560
Panel Set: 5 schematic sheet1 3	$IVEDWORK/h83020d__001				Wednesday, April 19, 2006		Panel Set: 5

Engine Controls (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



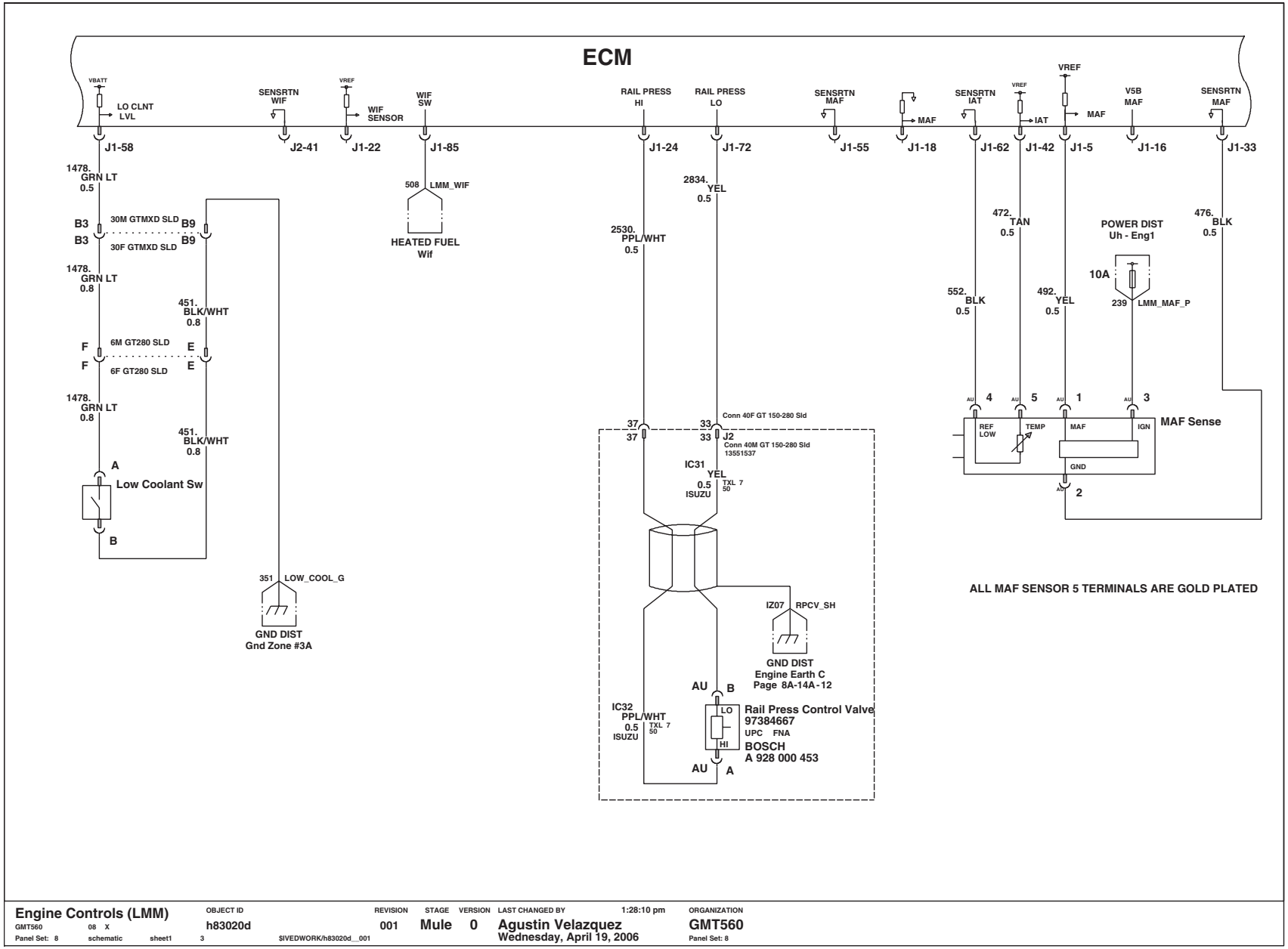
Engine Controls (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:28:10 pm	ORGANIZATION
GMT560 08 X	h83020d	001	Mule	0	Agustin Velazquez		GMT560
Panel Set: 6 schematic sheet1 3	$IVEDWORK/h83020d__001				Wednesday, April 19, 2006		Panel Set: 6

Engine Controls (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



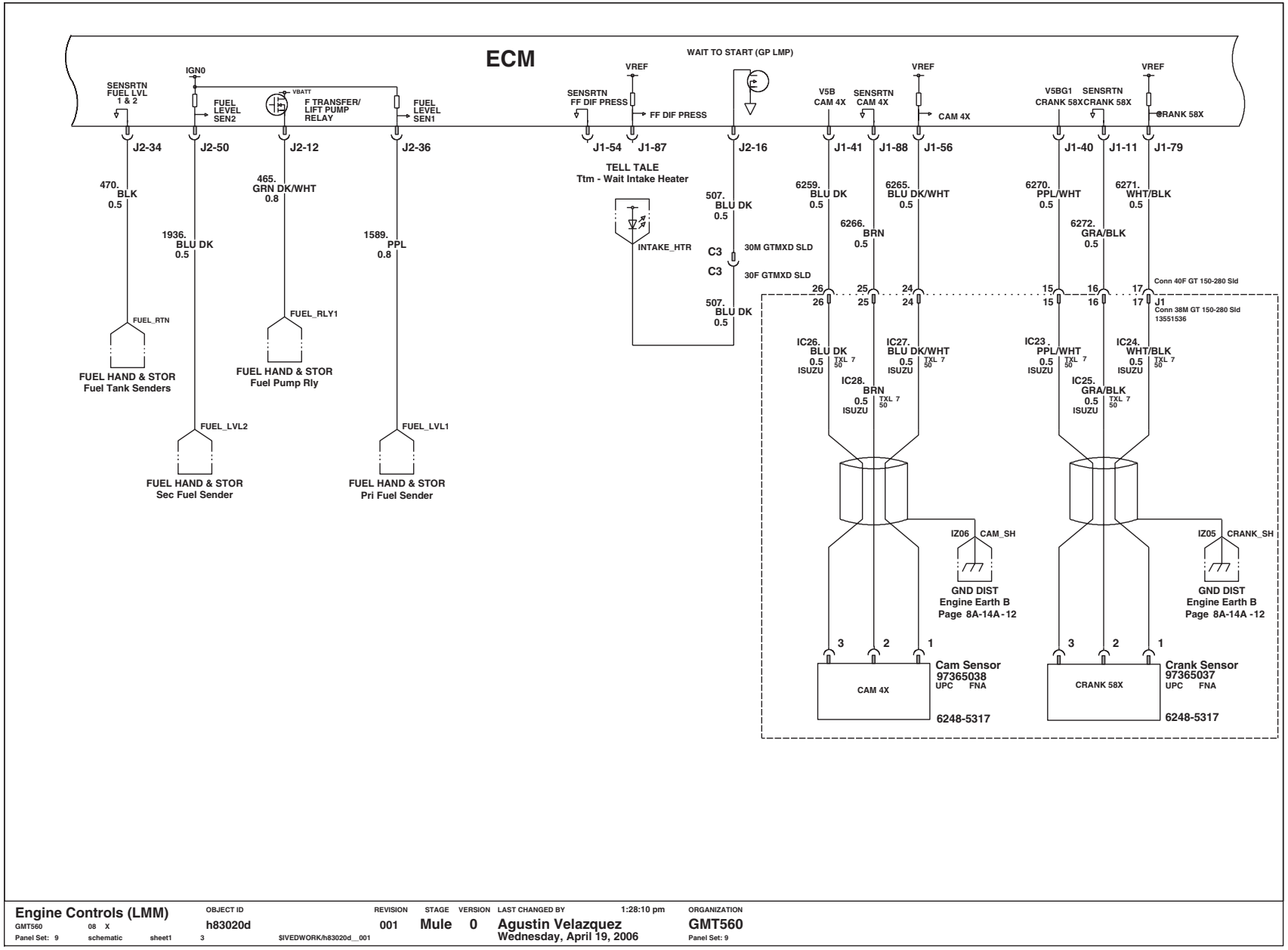
Engine Controls (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83020d	001	Mule	0	Agustin Velazquez	1:28:10 pm	GMT560
Panel Set: 7 schematic sheet1 3	$IVEDWORK/h83020d__001				Wednesday, April 19, 2006		Panel Set: 7

Engine Controls (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



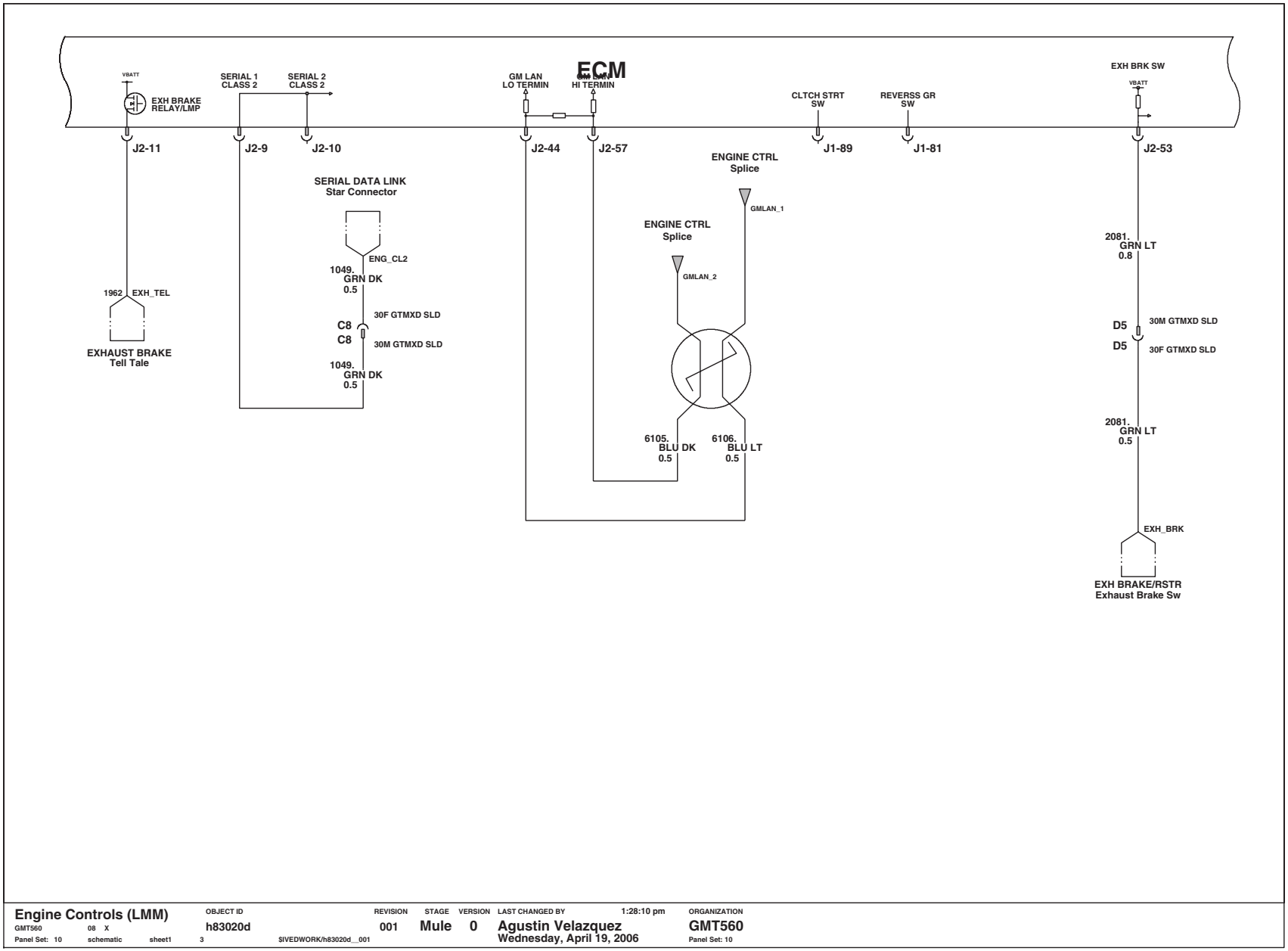
Engine Controls (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:28:10 pm	ORGANIZATION
GMT560 08 X	h83020d	001	Mule	0	Agustin Velazquez		GMT560
Panel Set: 8 schematic sheet1 3	$IVEDWORK/h83020d__001				Wednesday, April 19, 2006		Panel Set: 8

Engine Controls (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



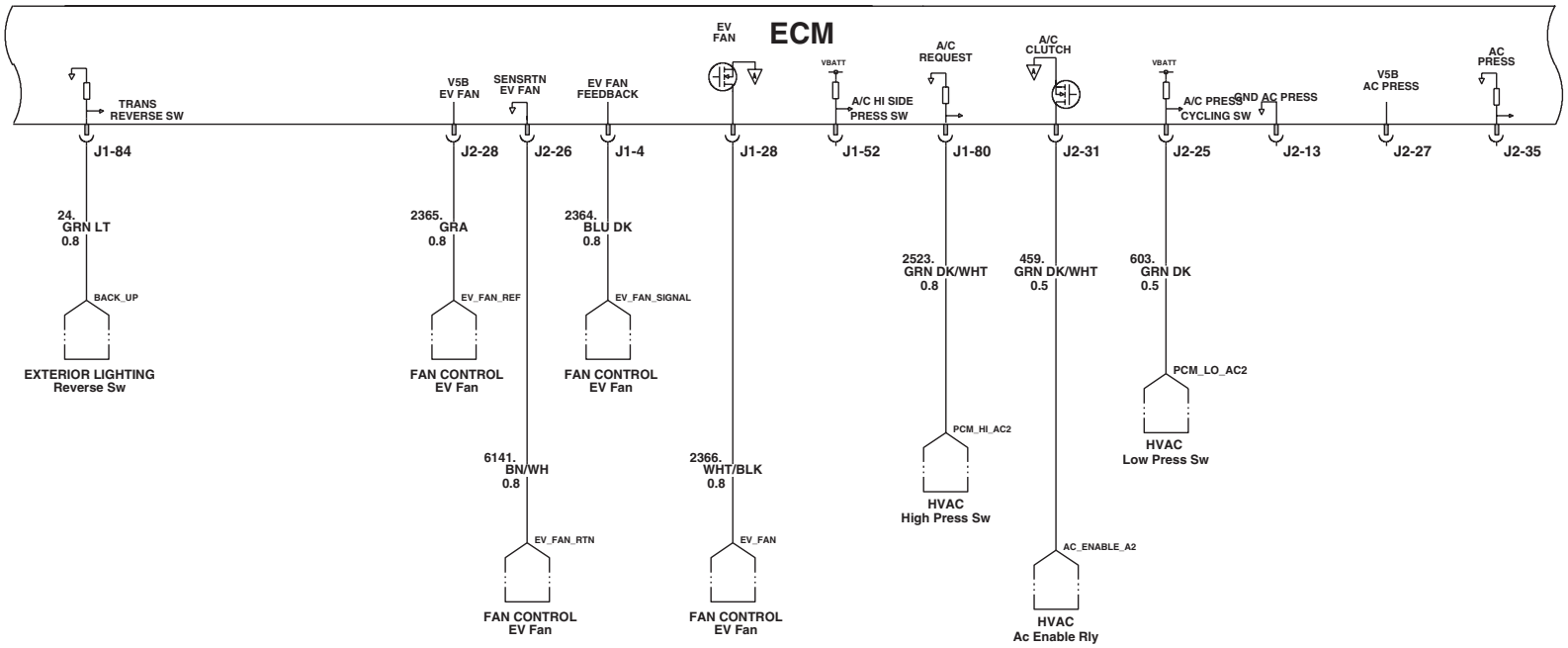
Engine Controls (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83020d	001	Mule	0	Agustin Velazquez	1:28:10 pm	GMT560
Panel Set: 9 schematic sheet1 3	$IVEDWORK/h83020d__001				Wednesday, April 19, 2006		Panel Set: 9

Engine Controls (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



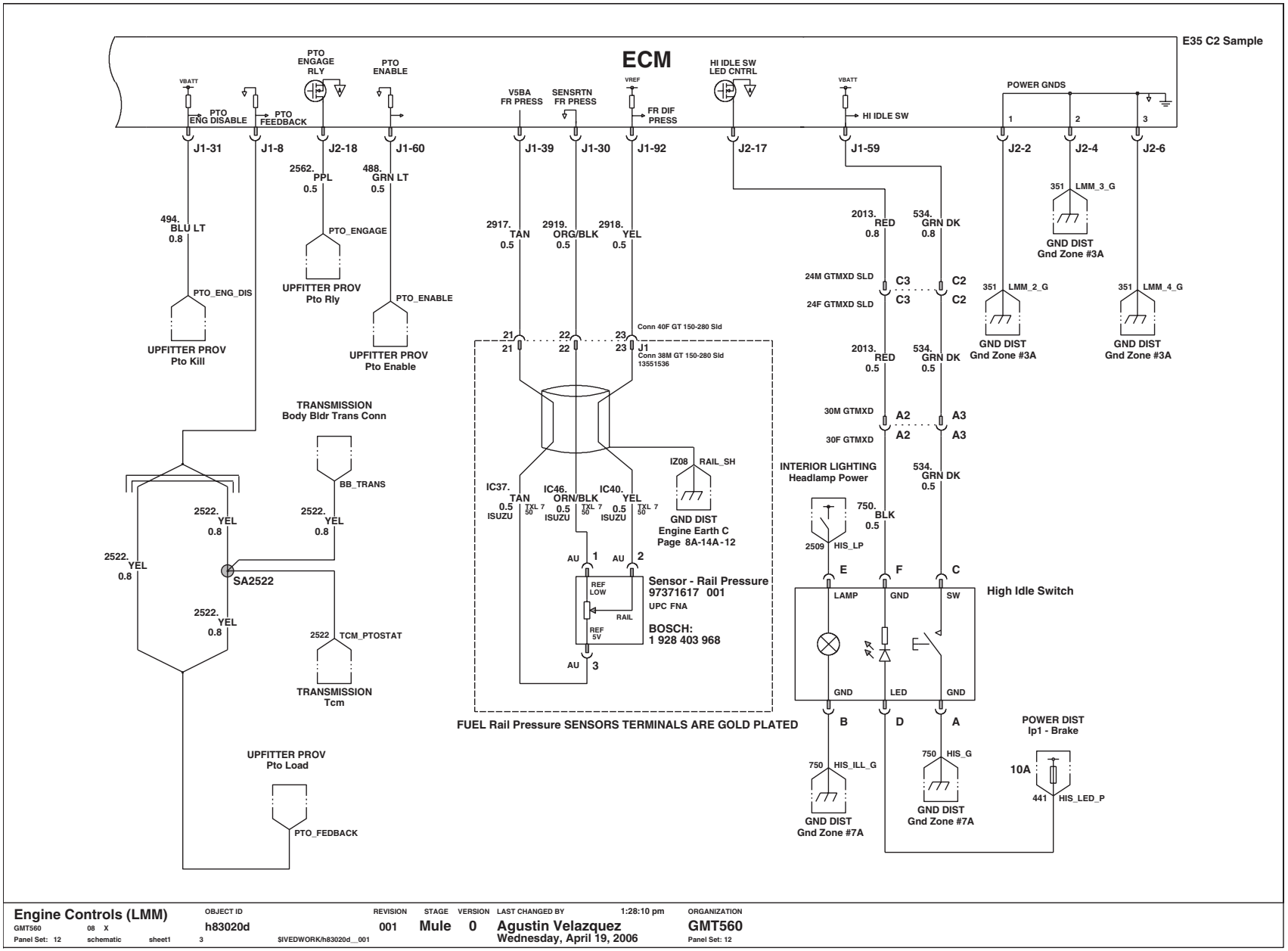
Engine Controls (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:28:10 pm	ORGANIZATION
GMT560 08 X	h83020d	001	Mule	0	Agustin Velazquez		GMT560
Panel Set: 10 schematic sheet1 3	$IVEDWORK/h83020d__001				Wednesday, April 19, 2006		Panel Set: 10

Engine Controls (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



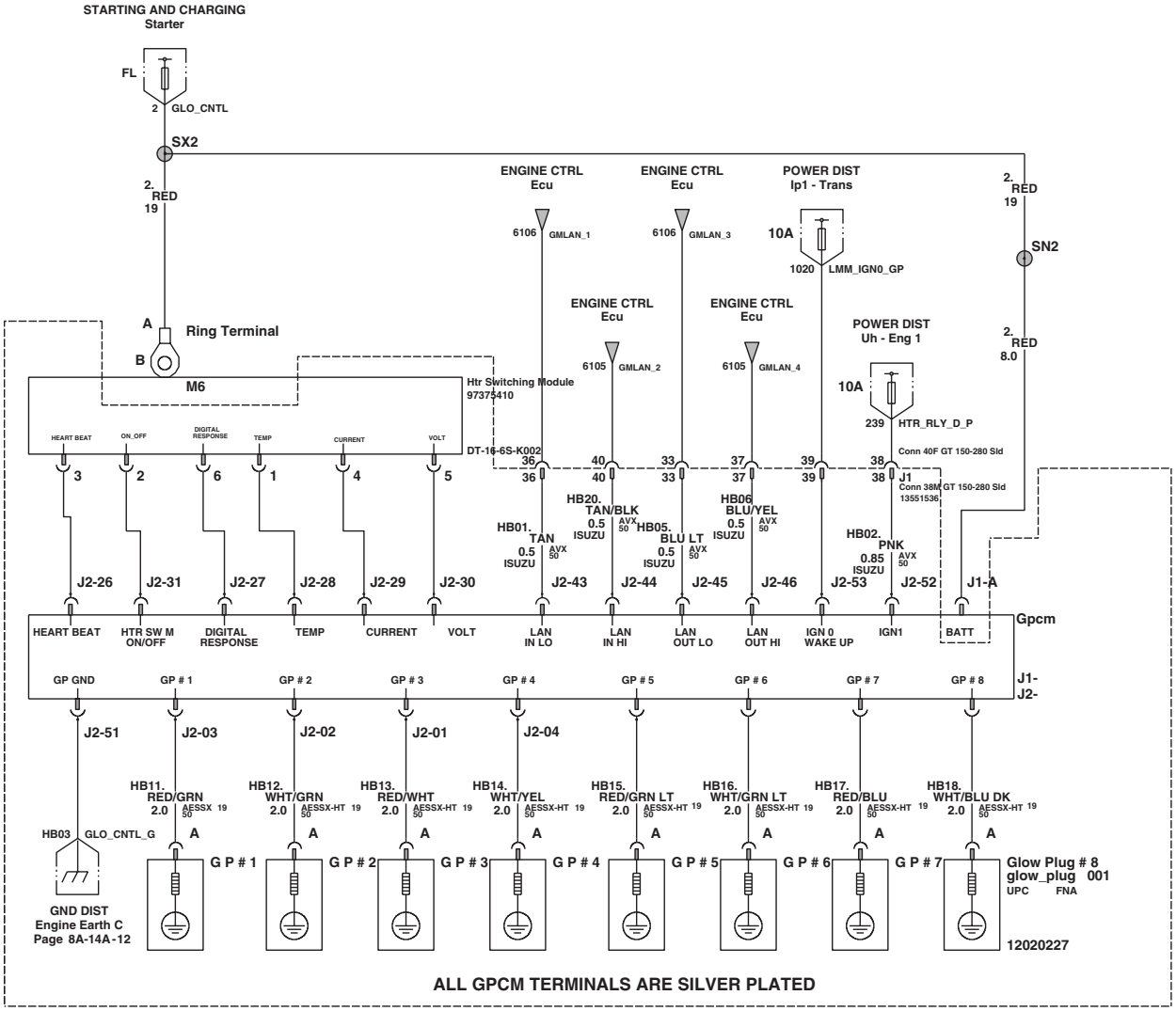
Engine Controls (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83020d	001	Mule	0	Agustin Velazquez	1:28:10 pm	GMT560
Panel Set: 11 schematic sheet1 3	$IVEDWORK/h83020d__001				Wednesday, April 19, 2006		Panel Set: 11

Engine Controls (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



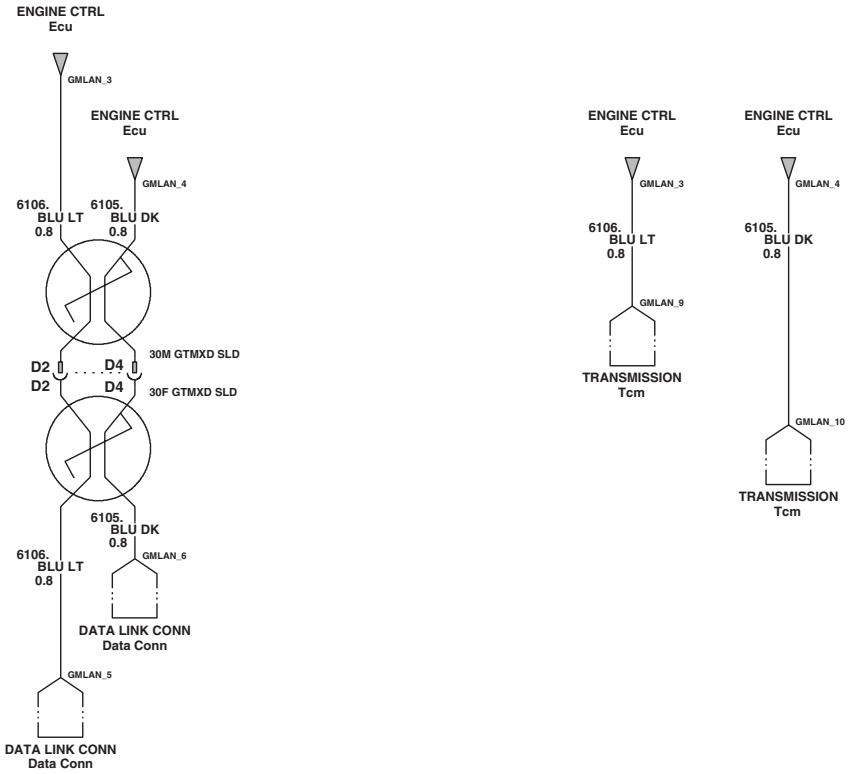
Engine Controls (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83020d	001	Mule	0	Agustin Velazquez	1:28:10 pm	GMT560
Panel Set: 12 schematic sheet1 3	$IVEDWORK/h83020d__001				Wednesday, April 19, 2006		Panel Set: 12

Engine Controls (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



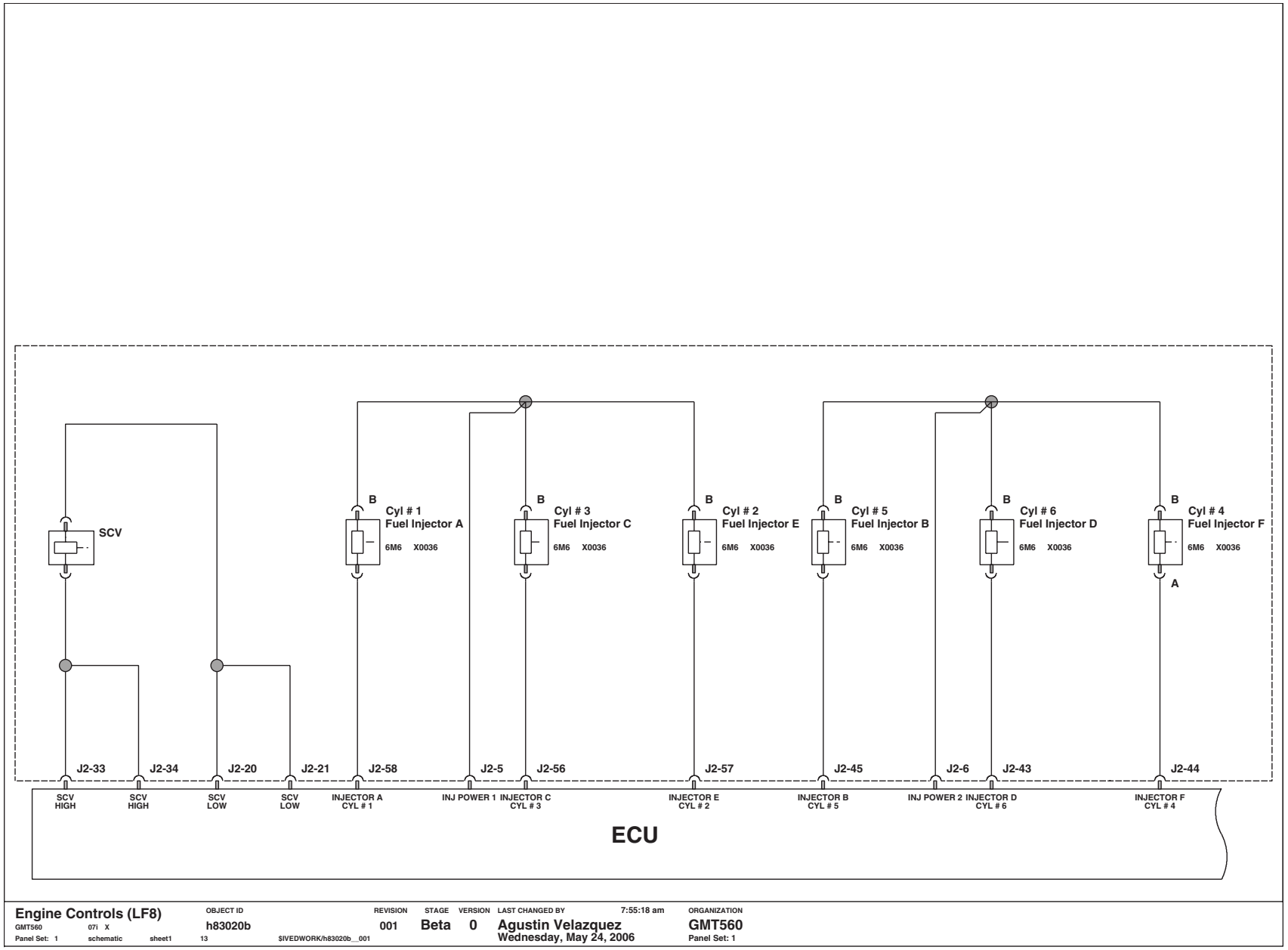
Engine Controls (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:28:10 pm	ORGANIZATION
GMT560 08 X	h83020d	001	Mule	0	Agustin Velazquez		GMT560
Panel Set: 13 schematic sheet1 3	$IVEDWORK/h83020d__001				Wednesday, April 19, 2006		Panel Set: 13

Engine Controls (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)

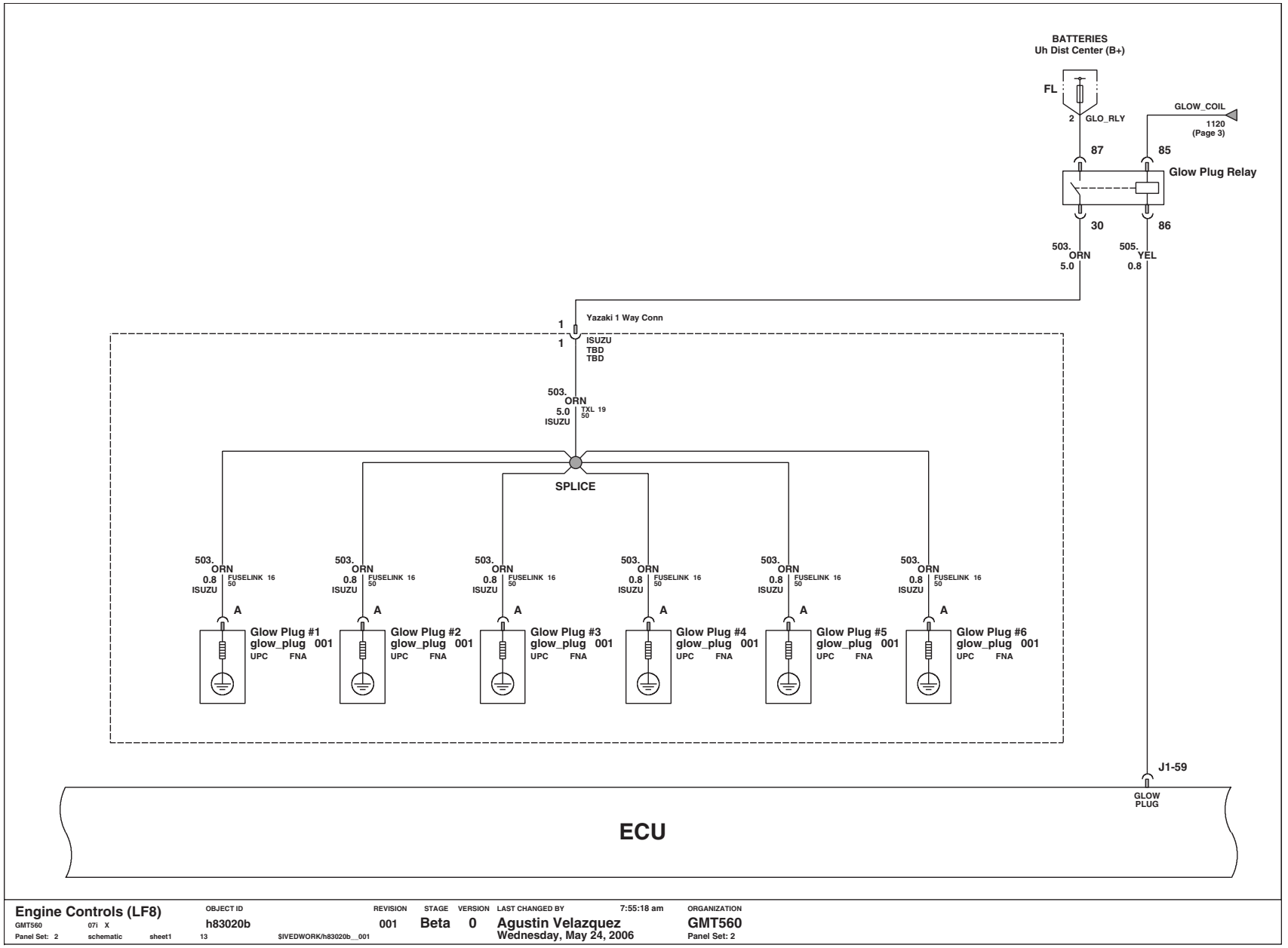


Engine Controls (LMM)			OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560	08 X		h83020d	001	X	0	Agustin Velazquez		GMT560
Panel Set: 14	schematic	sheet1 3	$IVEDWORK/h83020d__001				Wednesday, April 19, 2006	1:28:10 pm	Panel Set: 14

Engine Controls (LF8) 7.8L L6 Isuzu 6H - Diesel

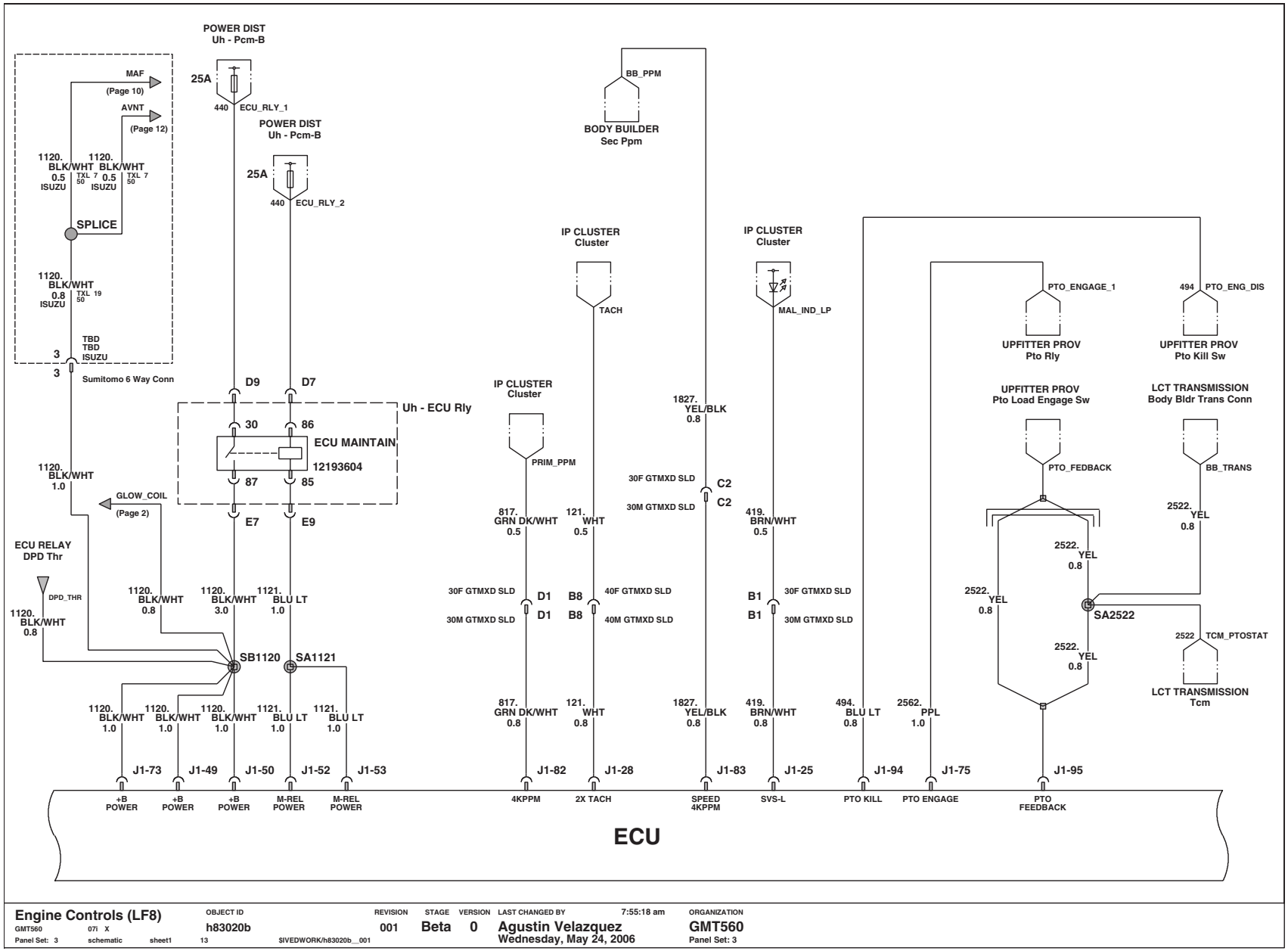


Engine Controls (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



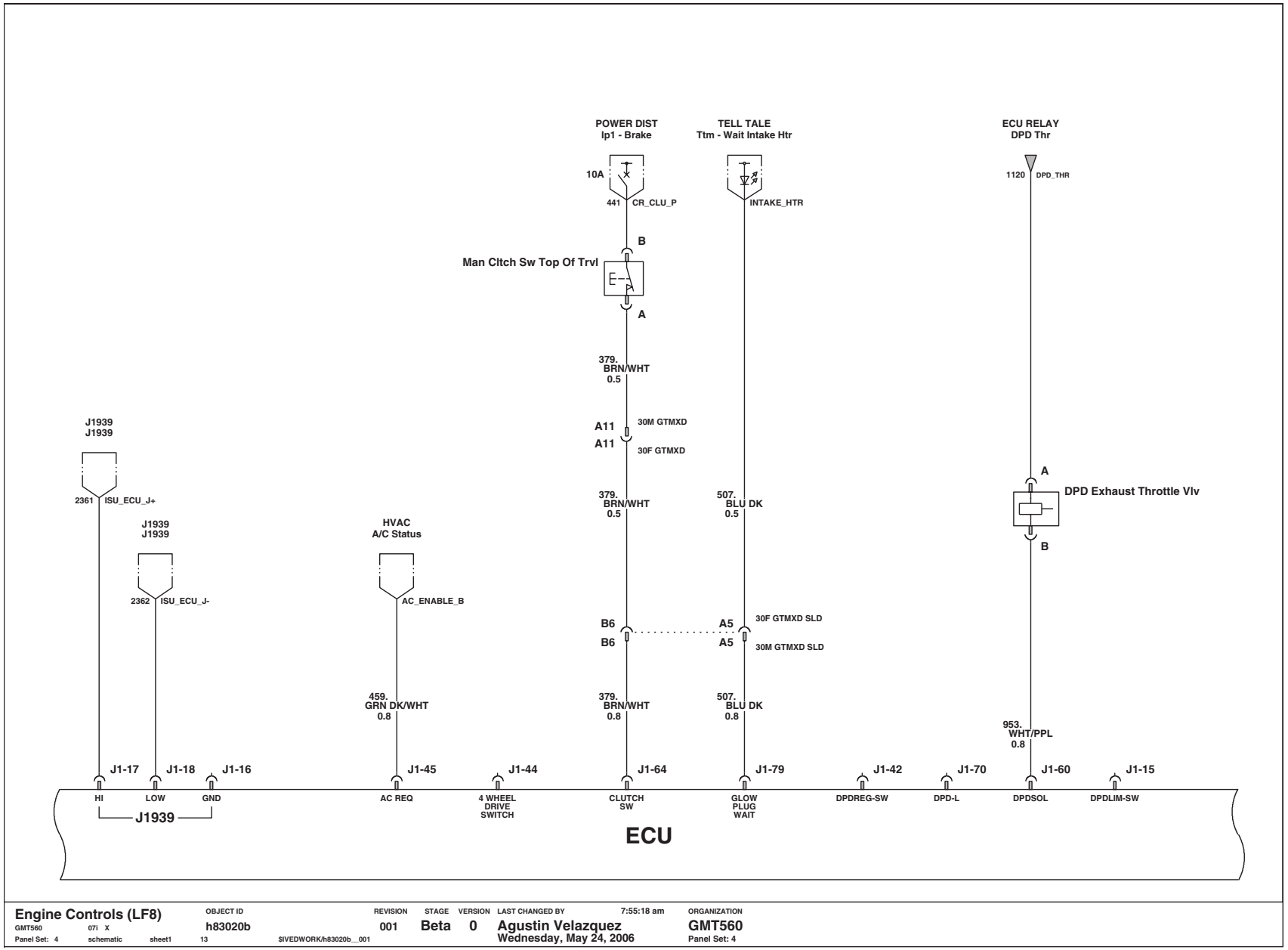
Engine Controls (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 07i X	h83020b	001	Beta	0	Agustin Velazquez	7:55:18 am	GMT560
Panel Set: 2 schematic sheet1 13	$IVEDWORK/h83020b__001				Wednesday, May 24, 2006		Panel Set: 2

Engine Controls (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



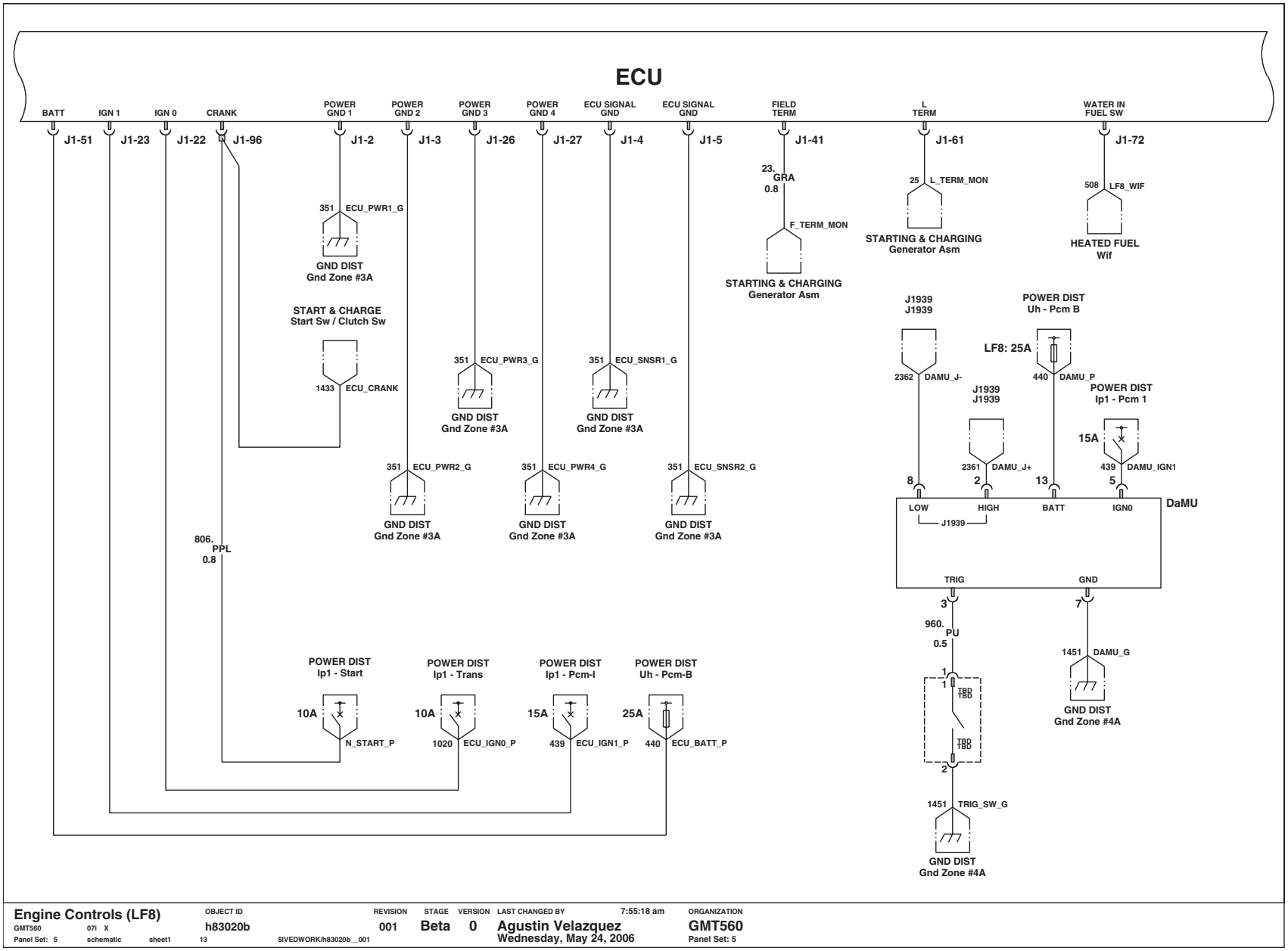
Engine Controls (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 071 X	h83020b	001	Beta	0	Agustin Velazquez	7:55:18 am	GMT560
Panel Set: 3 schematic sheet1 13	$IVEDWORK/h83020b__001				Wednesday, May 24, 2006		Panel Set: 3

Engine Controls (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



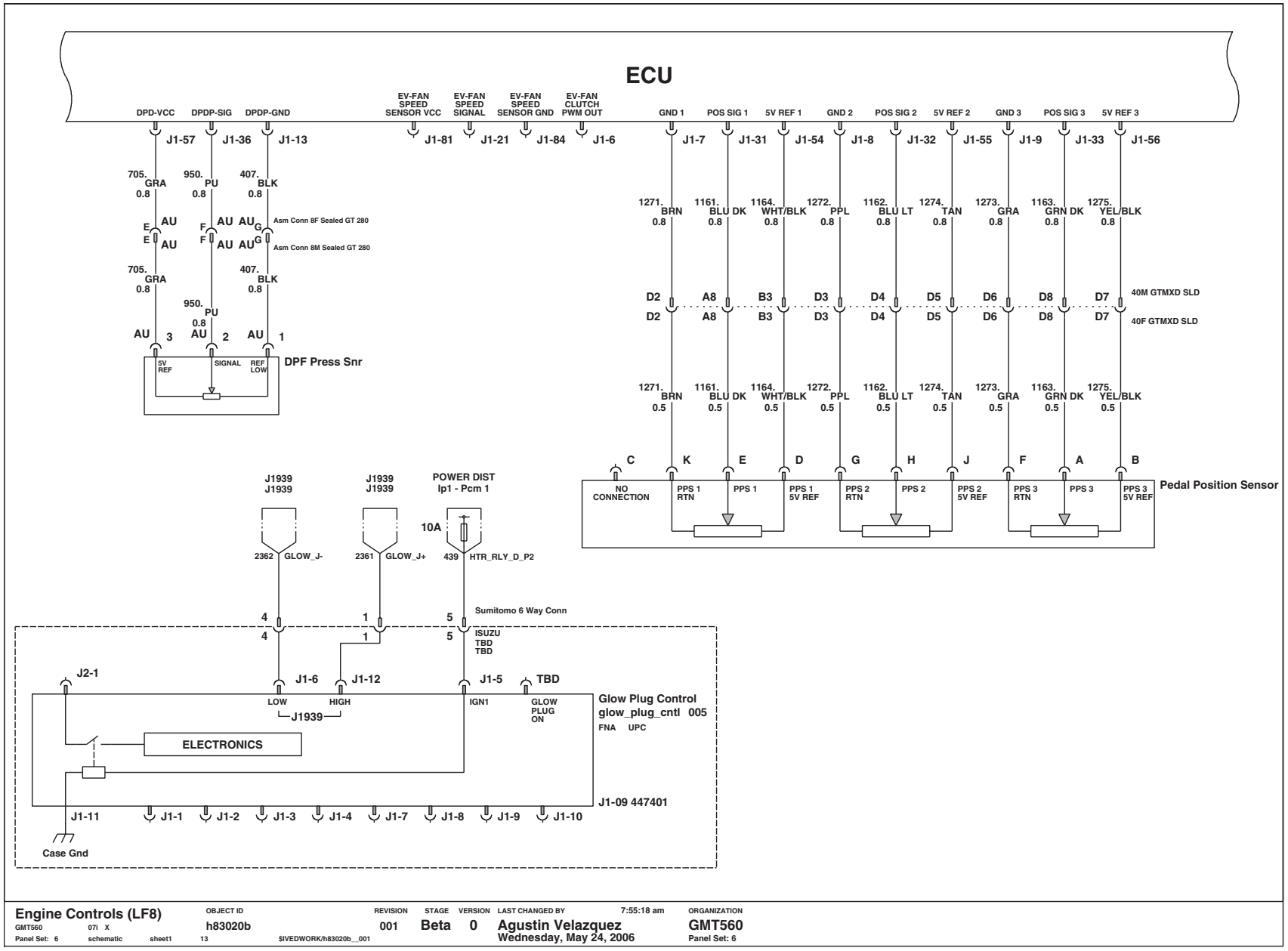
Engine Controls (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 07i X	h83020b	001	Beta	0	Agustin Velazquez	7:55:18 am	GMT560
Panel Set: 4 schematic sheet1 13	$IVEDWORK/h83020b__001				Wednesday, May 24, 2006		Panel Set: 4

Engine Controls (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



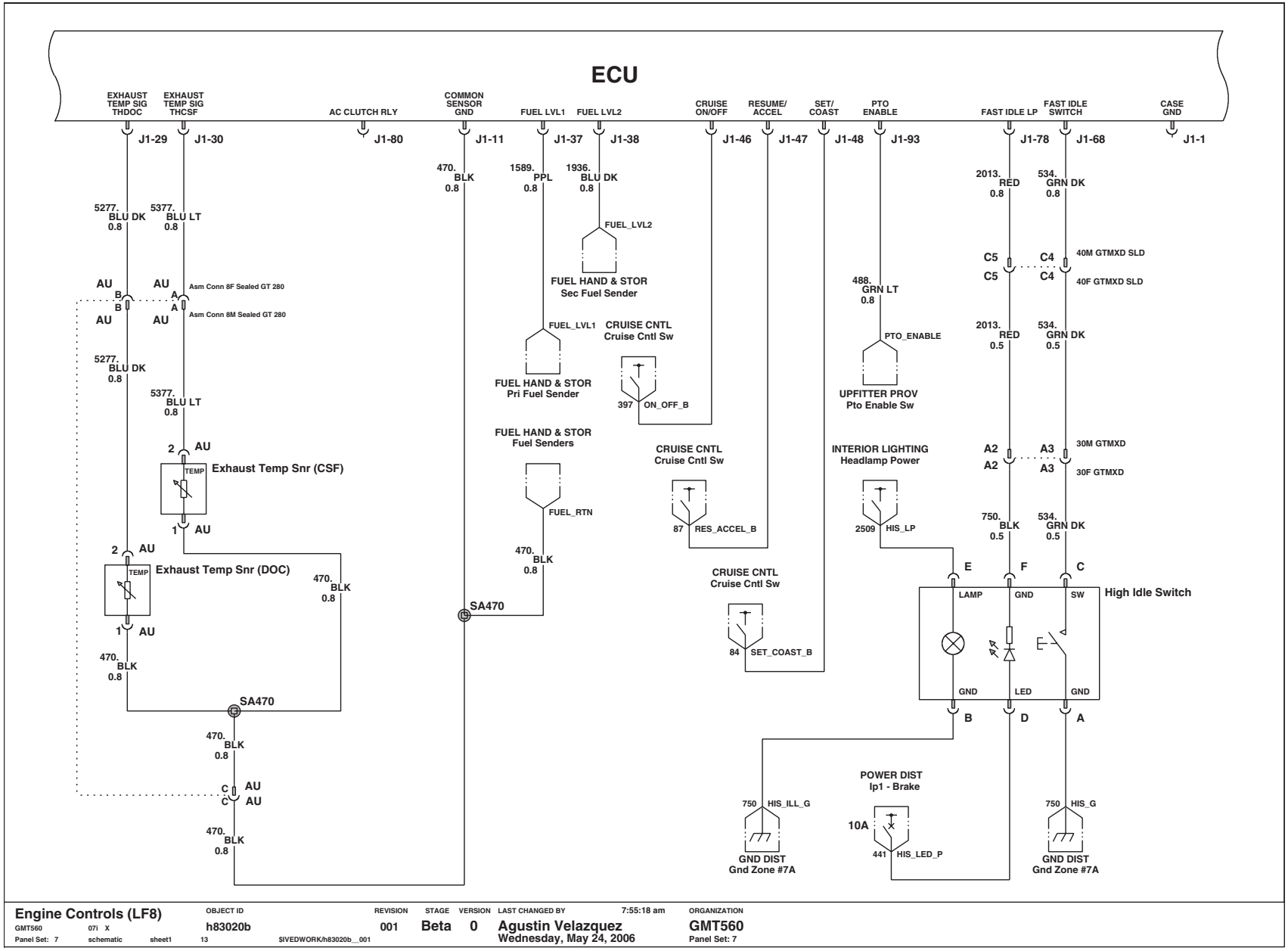
Engine Controls (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 07i X	h83020b	001	Beta	0	Agustin Velazquez	7:55:18 am	GMT560
Panel Set: 5 schematic sheet1 13 $IVEDWORK/h83020b__001					Wednesday, May 24, 2006		Panel Set: 5

Engine Controls (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)

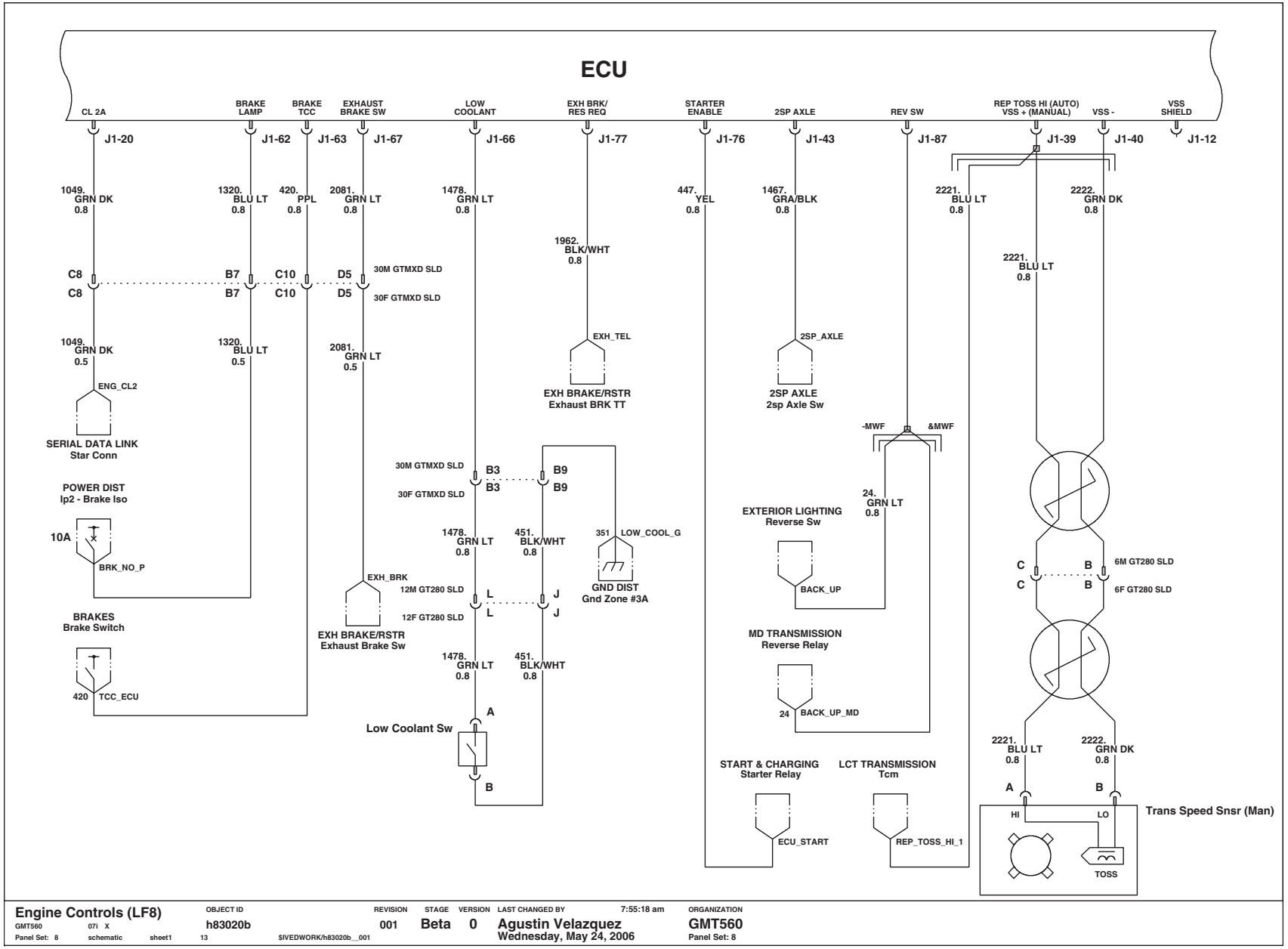


Engine Controls (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 07i X	h83020b	001	Beta	0	Agustin Velazquez	7:55:18 am	GMT560
Panel Set: 6 schematic sheet1 13	$IVEDWORK/h83020b__001				Wednesday, May 24, 2006		Panel Set: 6

Engine Controls (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)

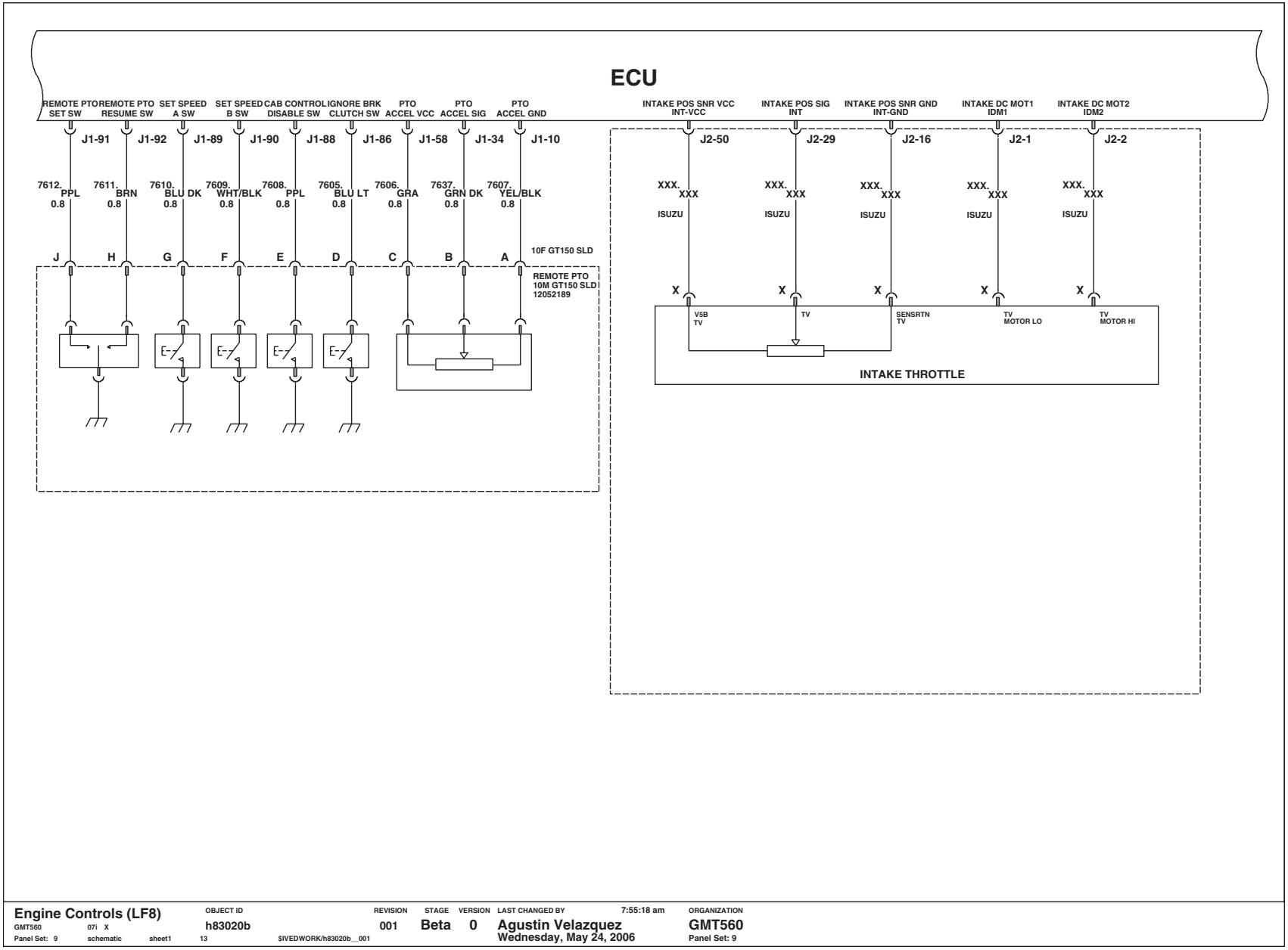


Engine Controls (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



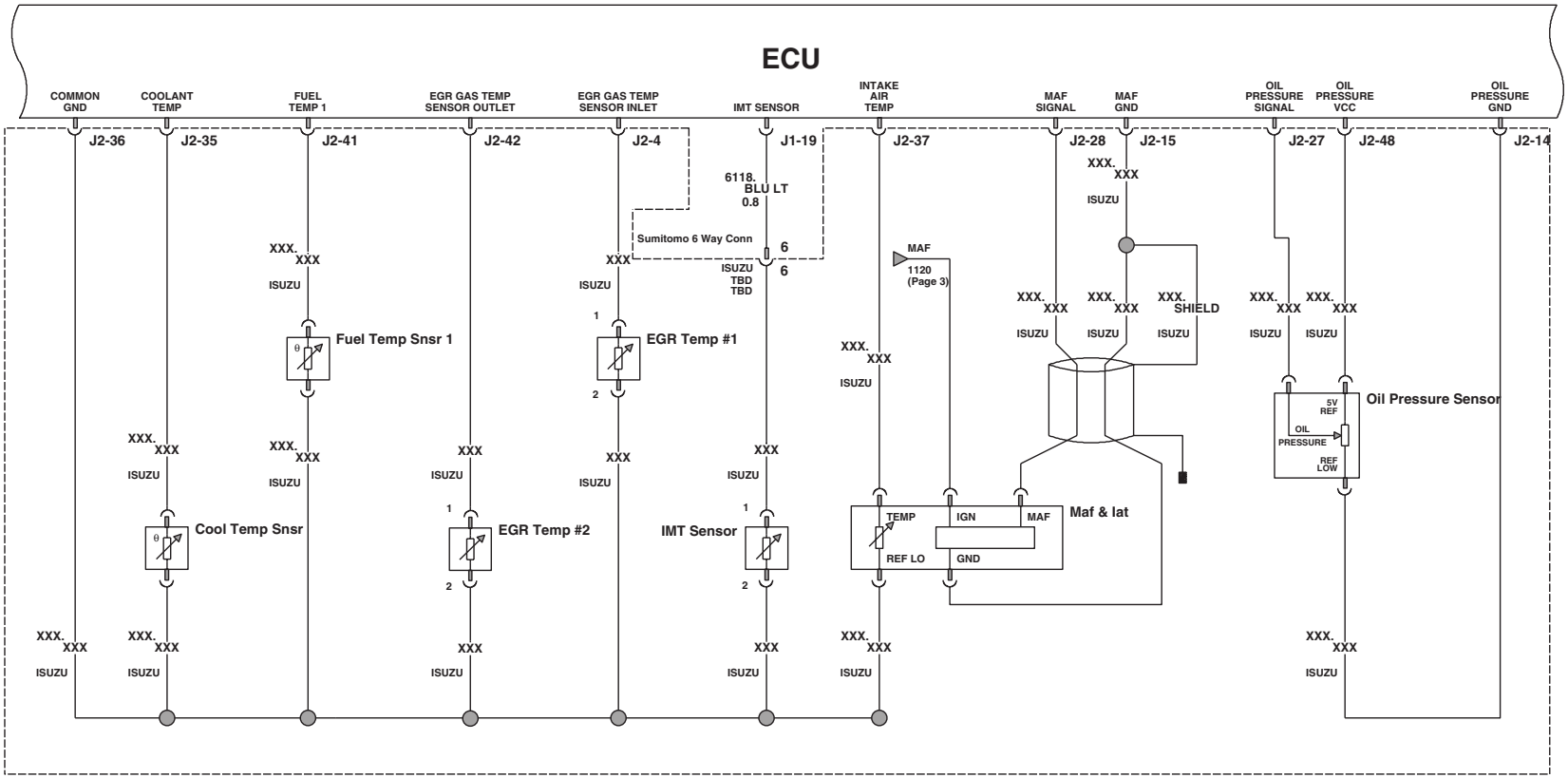
Engine Controls (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 07i X	h83020b	001	Beta	0	Agustin Velazquez	7:55:18 am	GMT560
Panel Set: 8 schematic sheet1 13	$IVEDWORK/h83020b__001				Wednesday, May 24, 2006		Panel Set: 8

Engine Controls (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



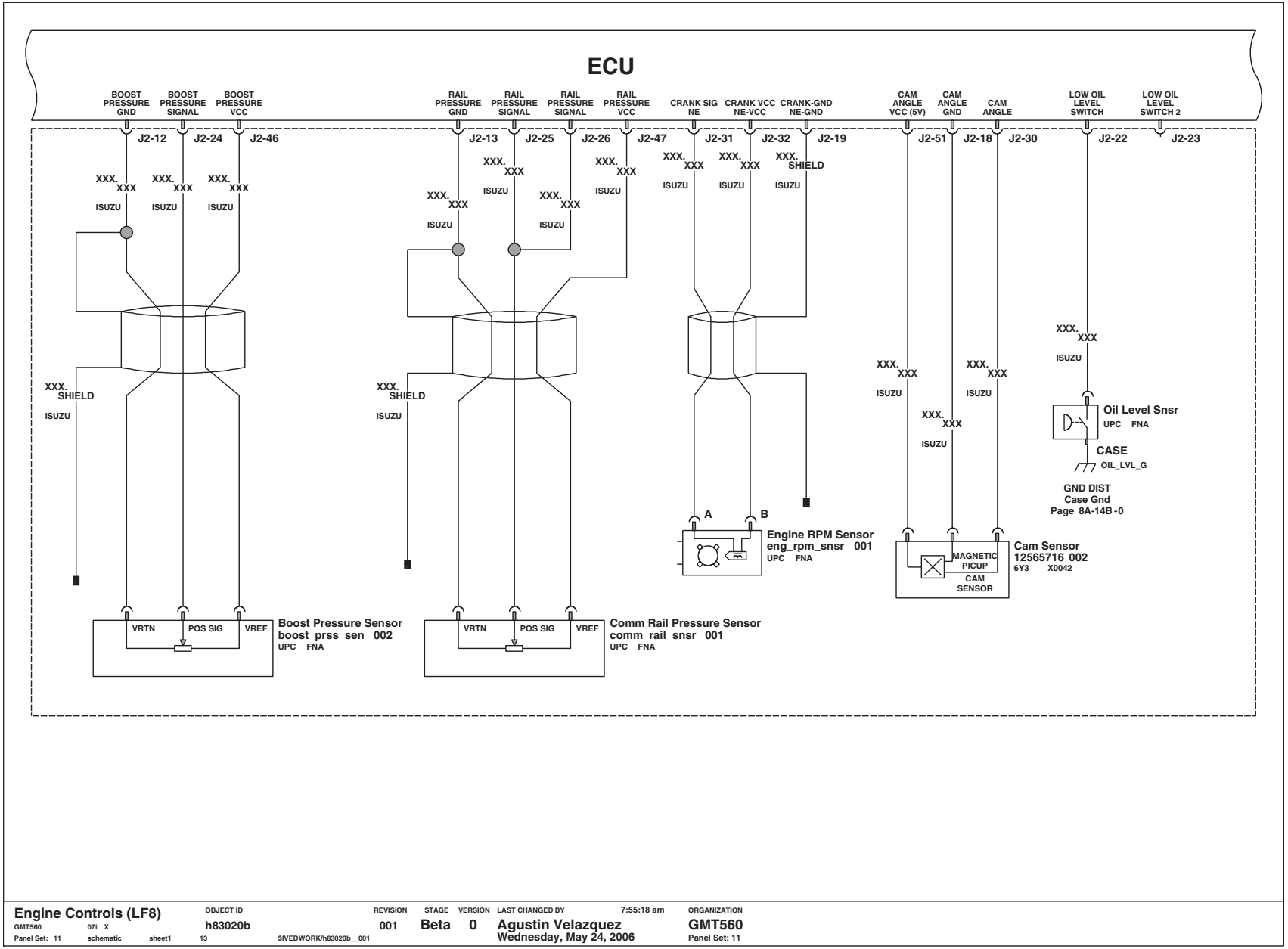
Engine Controls (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	7:55:18 am	ORGANIZATION
GMT560 07i X	h83020b	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 9 schematic sheet1 13	$IVEDWORK/h83020b__001				Wednesday, May 24, 2006		Panel Set: 9

Engine Controls (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



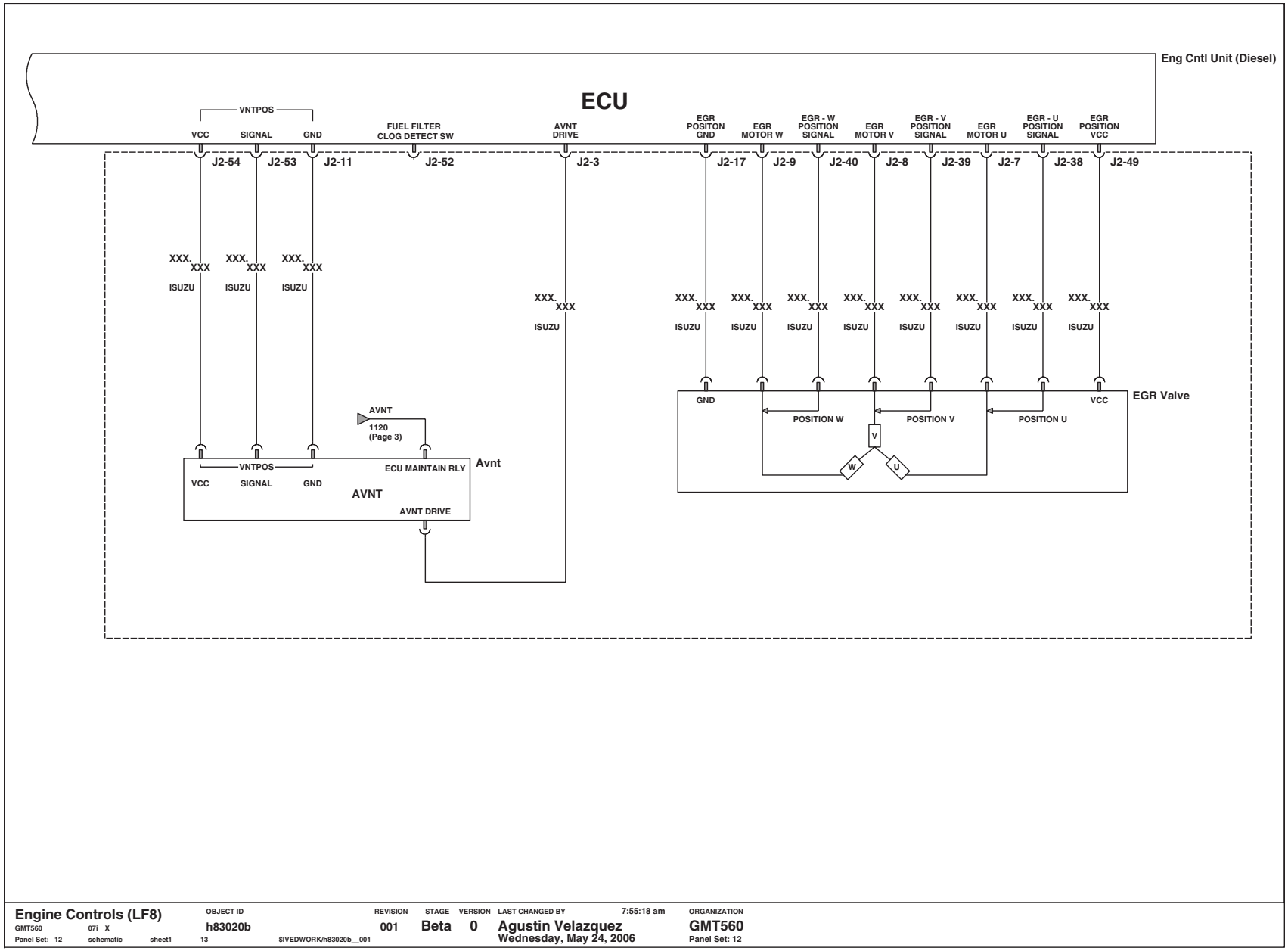
Engine Controls (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 07i X	h83020b	001	Beta	0	Agustin Velazquez	7:55:18 am	GMT560
Panel Set: 10 schematic sheet1 13	$IVEDWORK/h83020b__001				Wednesday, May 24, 2006		Panel Set: 10

Engine Controls (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



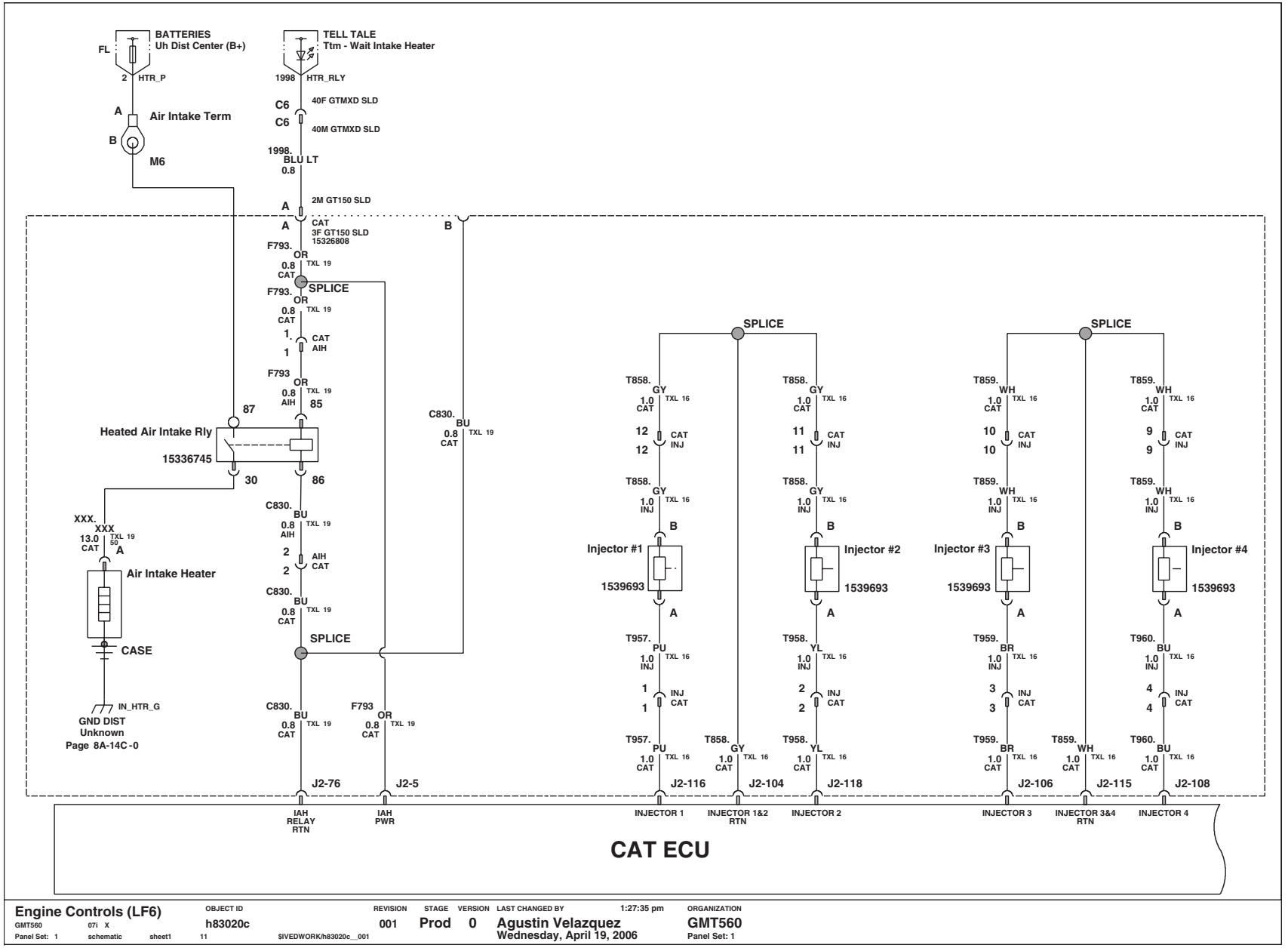
Engine Controls (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	7:55:18 am	ORGANIZATION
GMT560 07I X	h83020b	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 11 schematic sheet1 13 $IVEDWORK/h83020b__001					Wednesday, May 24, 2006		Panel Set: 11

Engine Controls (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



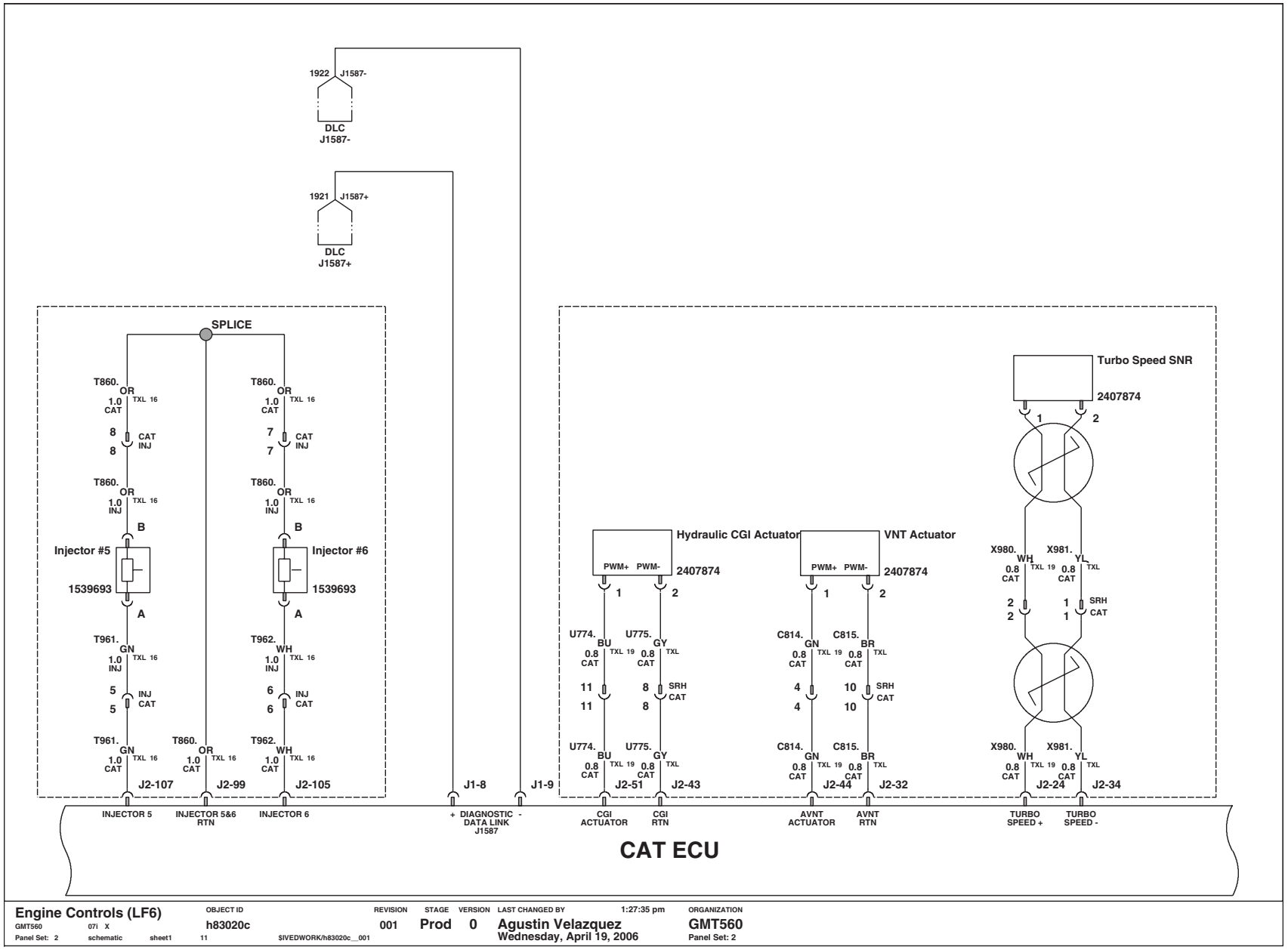
Engine Controls (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 07i X	h83020b	001	Beta	0	Agustin Velazquez	7:55:18 am	GMT560
Panel Set: 12 schematic sheet1 13	$IVEDWORK/h83020b__001				Wednesday, May 24, 2006		Panel Set: 12

Engine Controls (LF6) 7.2L L6 Caterpillar® C7 - Diesel



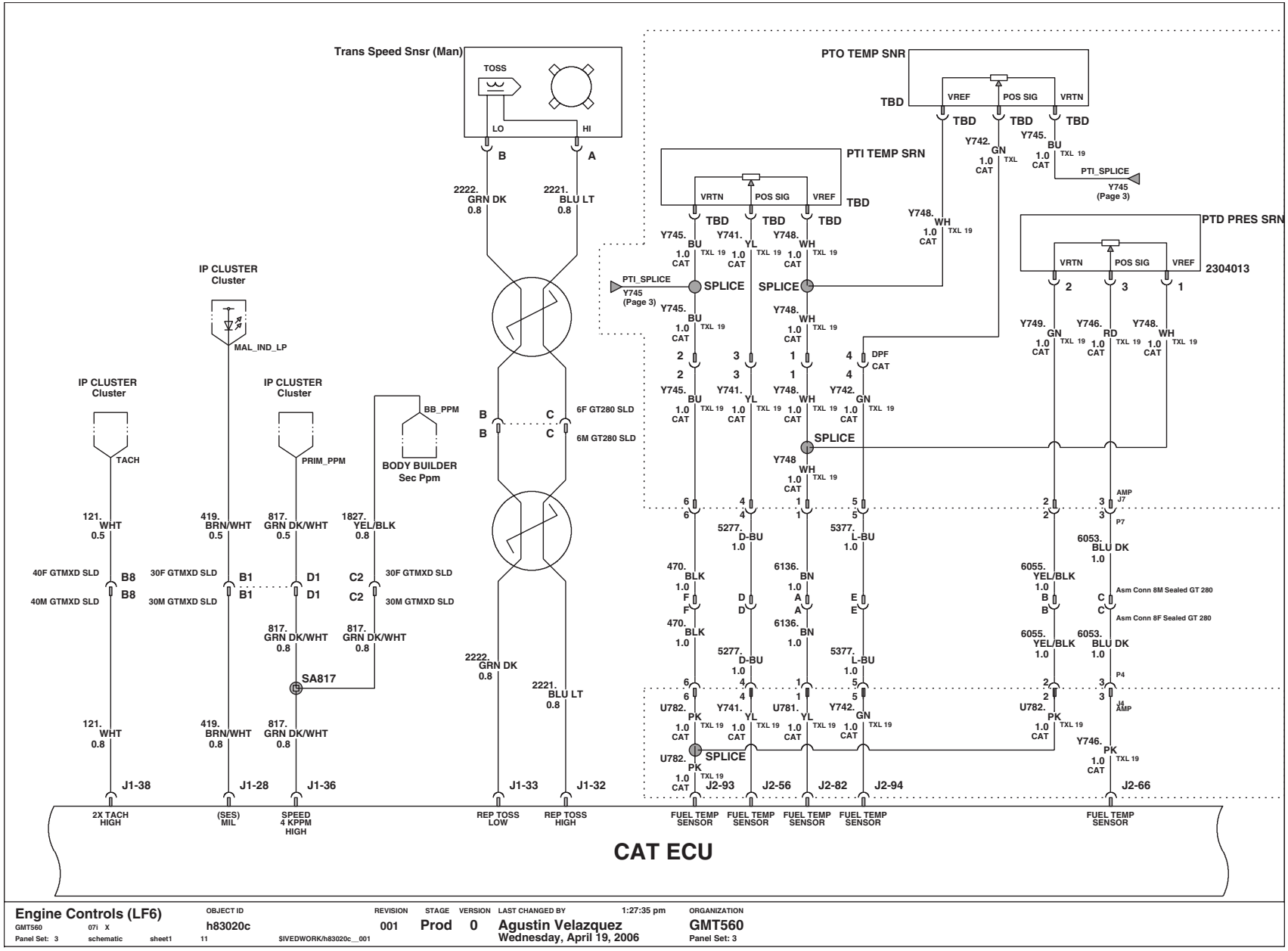
Engine Controls (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:27:35 pm	ORGANIZATION
GMT560 07i X	h83020c	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 11	$IVEDWORK/h83020c__001				Wednesday, April 19, 2006		Panel Set: 1

Engine Controls (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



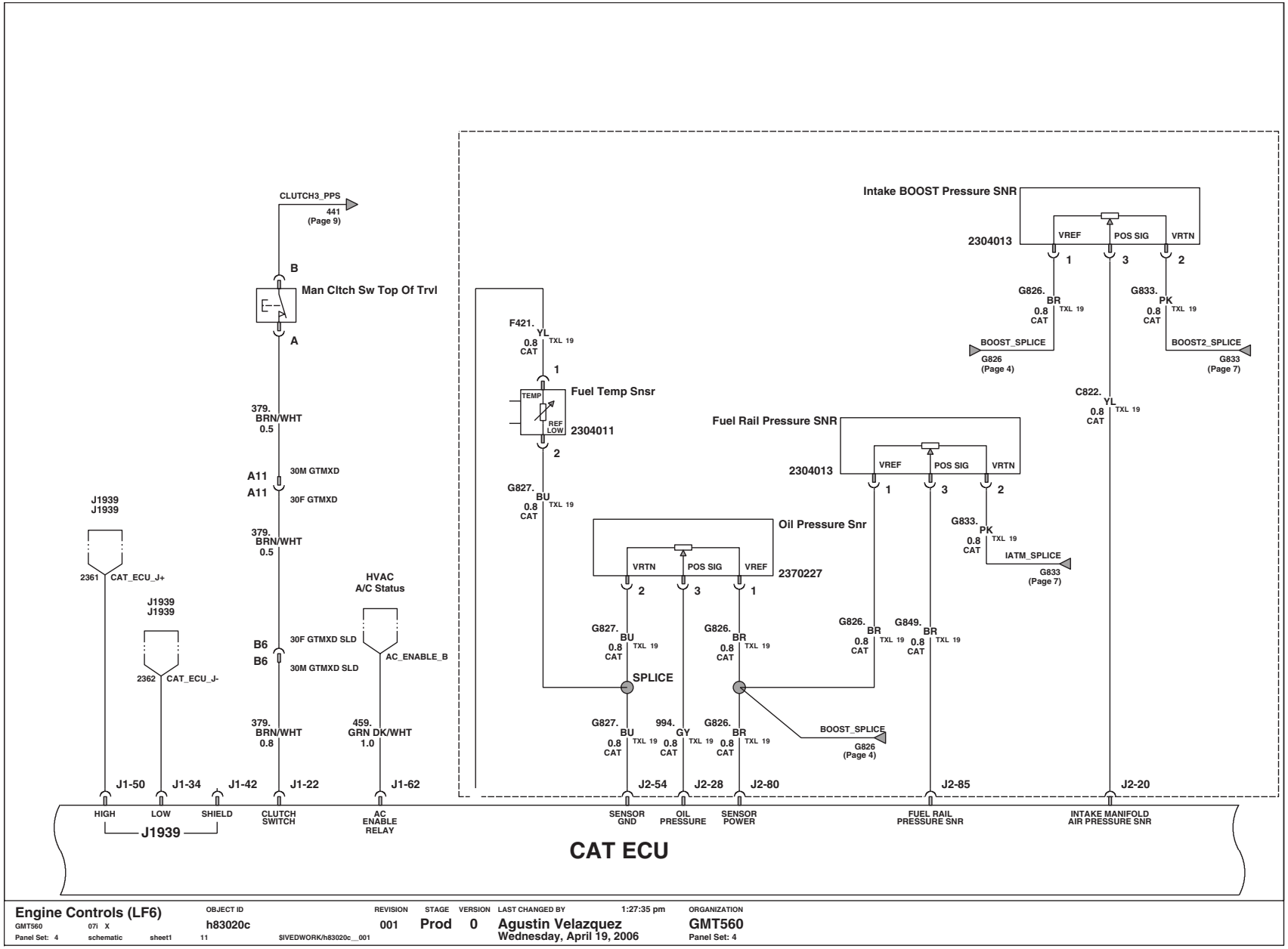
Engine Controls (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 07i X	h83020c	001	Prod	0	Agustin Velazquez	1:27:35 pm	GMT560
Panel Set: 2 schematic sheet1 11	$IVEDWORK/h83020c__001				Wednesday, April 19, 2006		Panel Set: 2

Engine Controls (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



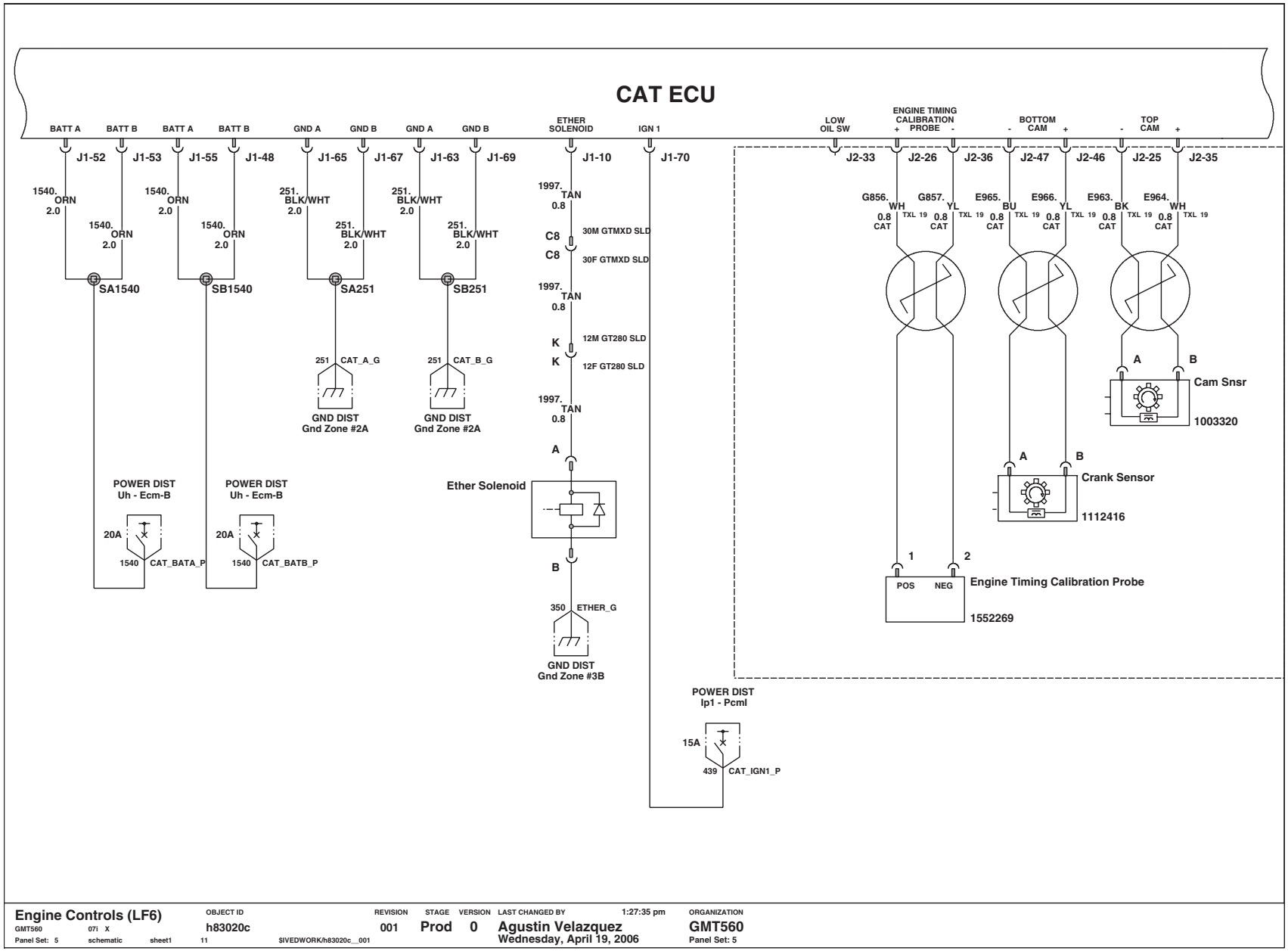
Engine Controls (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 07i X	h83020c	001	Prod	0	Agustin Velazquez	1:27:35 pm	GMT560
Panel Set: 3 schematic sheet1 11	$IVEDWORK/h83020c__001				Wednesday, April 19, 2006		Panel Set: 3

Engine Controls (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)

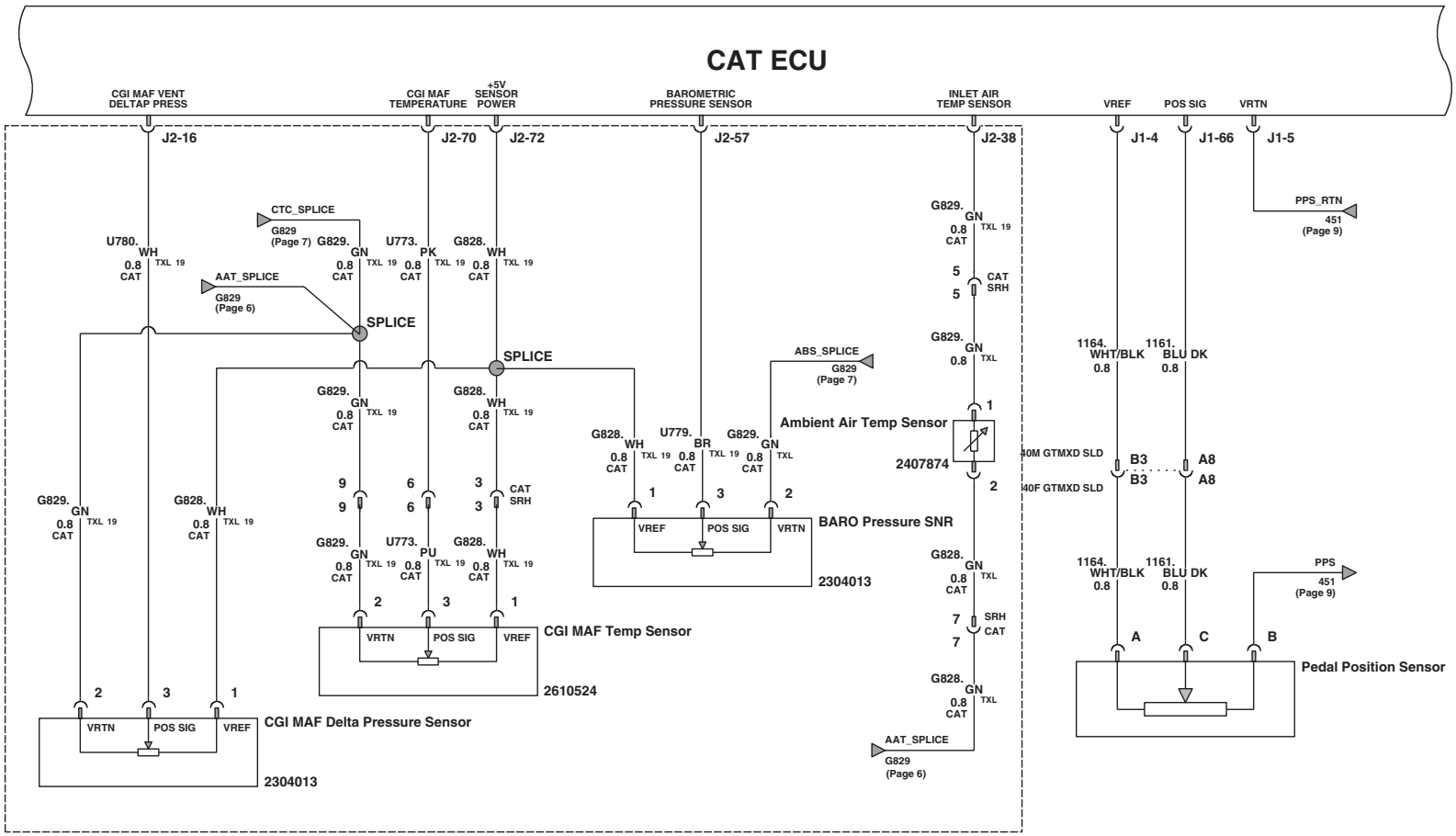


Engine Controls (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 07i X	h83020c	001	Prod	0	Agustin Velazquez	1:27:35 pm	GMT560
Panel Set: 4 schematic sheet1 11	$IVEDWORK/h83020c__001				Wednesday, April 19, 2006		Panel Set: 4

Engine Controls (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)

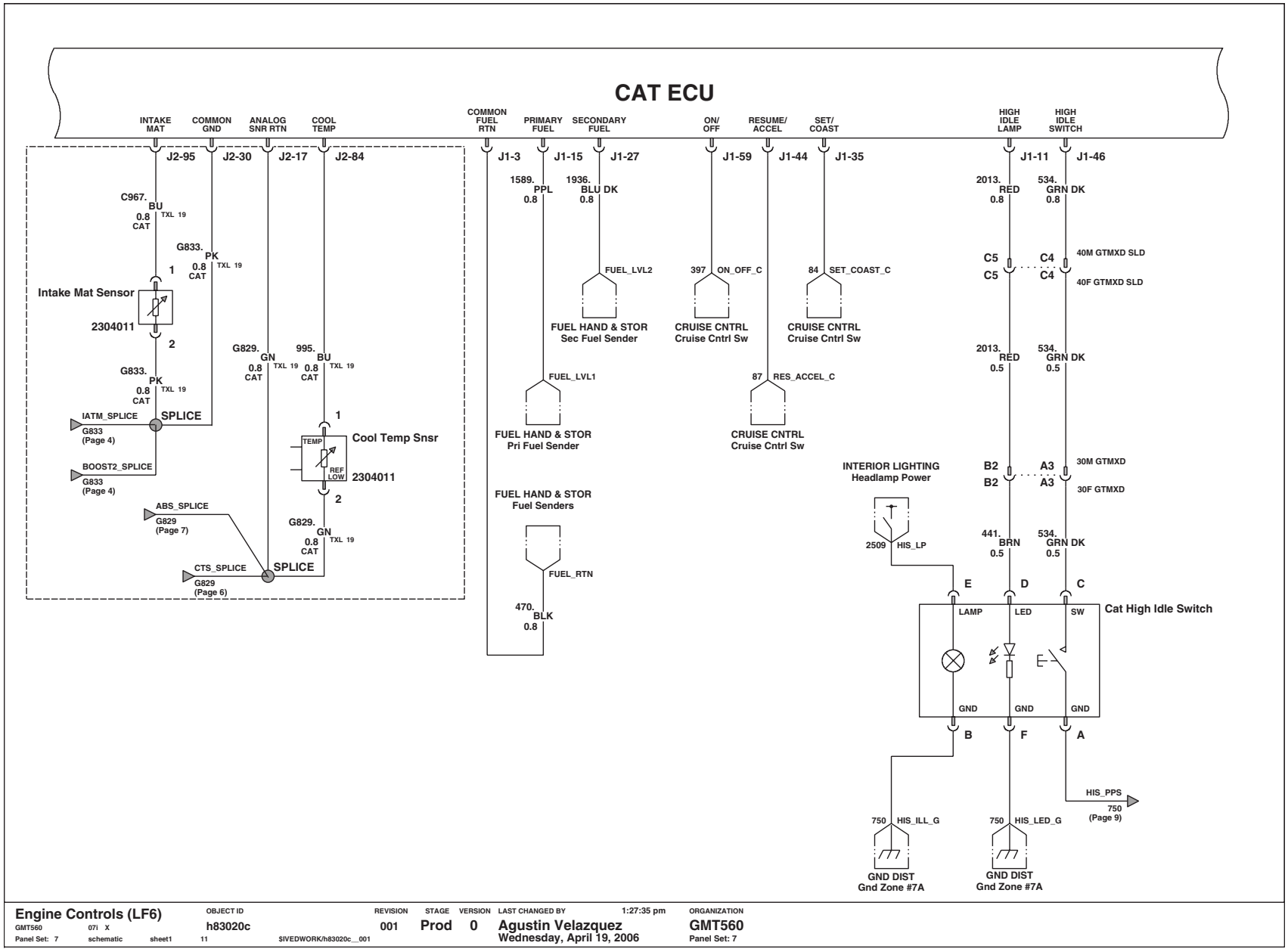


Engine Controls (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



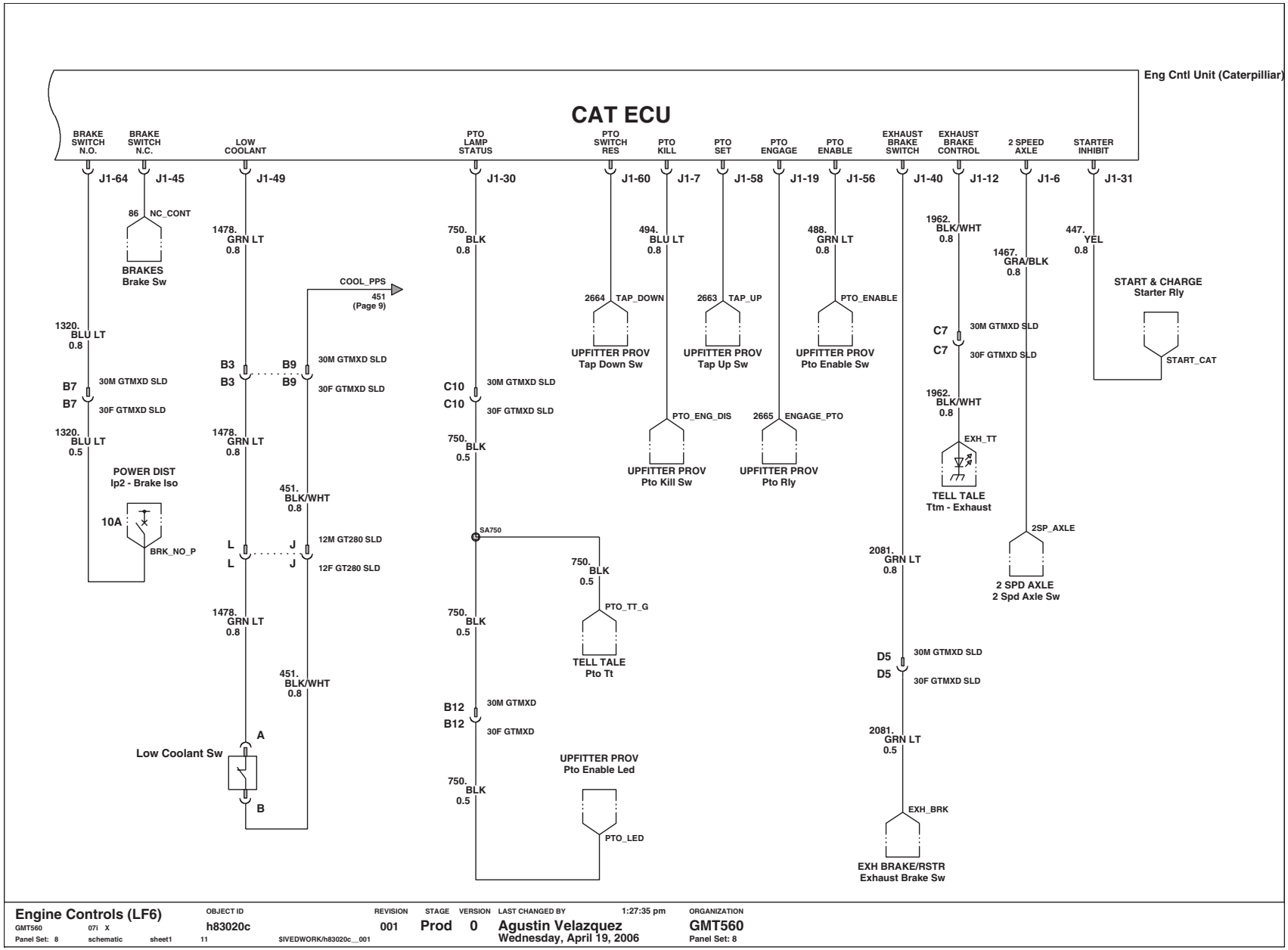
Engine Controls (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 07i X	h83020c	001	Prod	0	Agustin Velazquez	1:27:35 pm	GMT560
Panel Set: 6 schematic sheet1 11	$IVEDWORK/h83020c__001				Wednesday, April 19, 2006		Panel Set: 6

Engine Controls (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



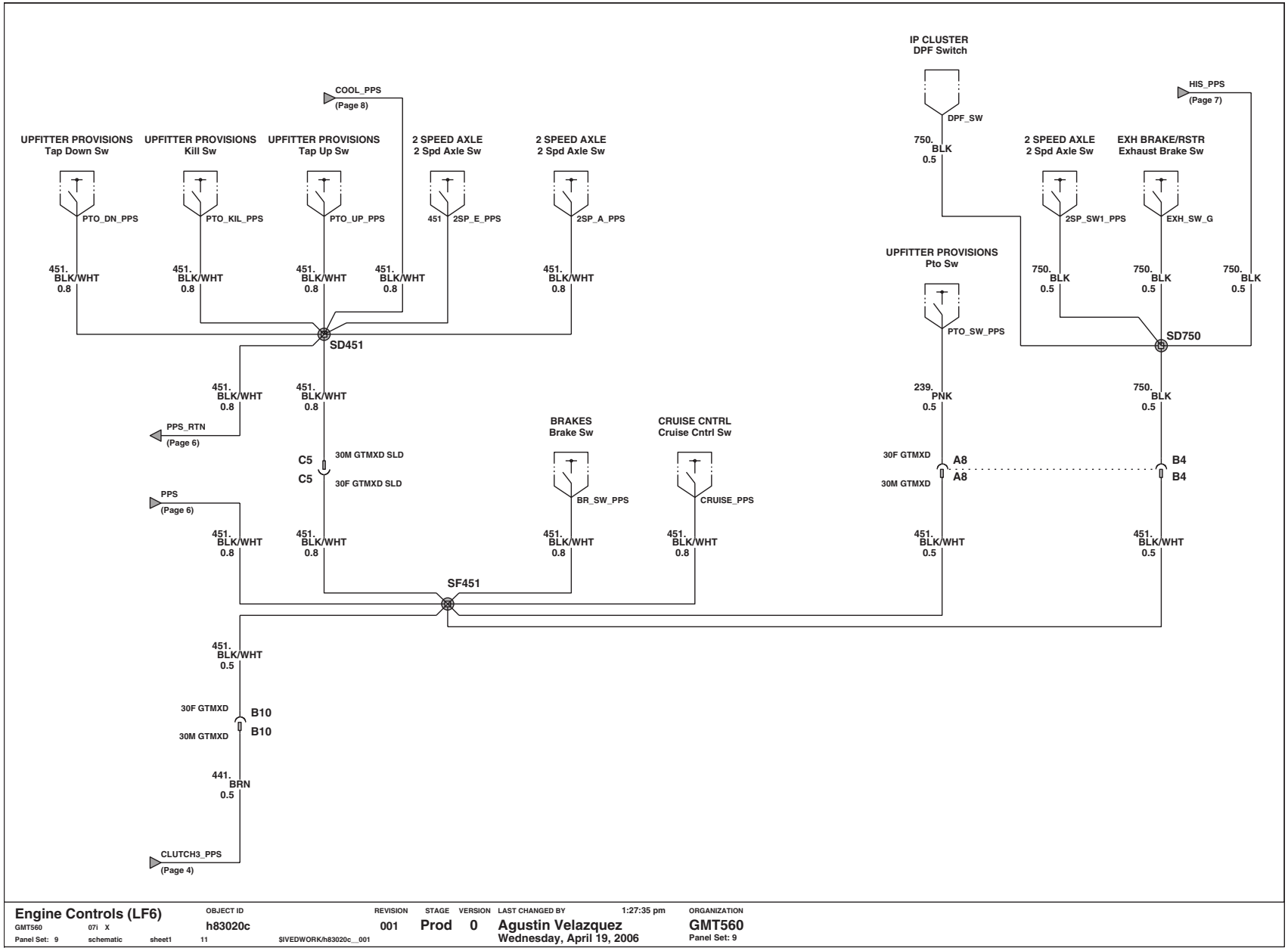
Engine Controls (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 07i X	h83020c	001	Prod	0	Agustin Velazquez	1:27:35 pm	GMT560
Panel Set: 7 schematic sheet1 11	$IVEDWORK/h83020c__001				Wednesday, April 19, 2006		Panel Set: 7

Engine Controls (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



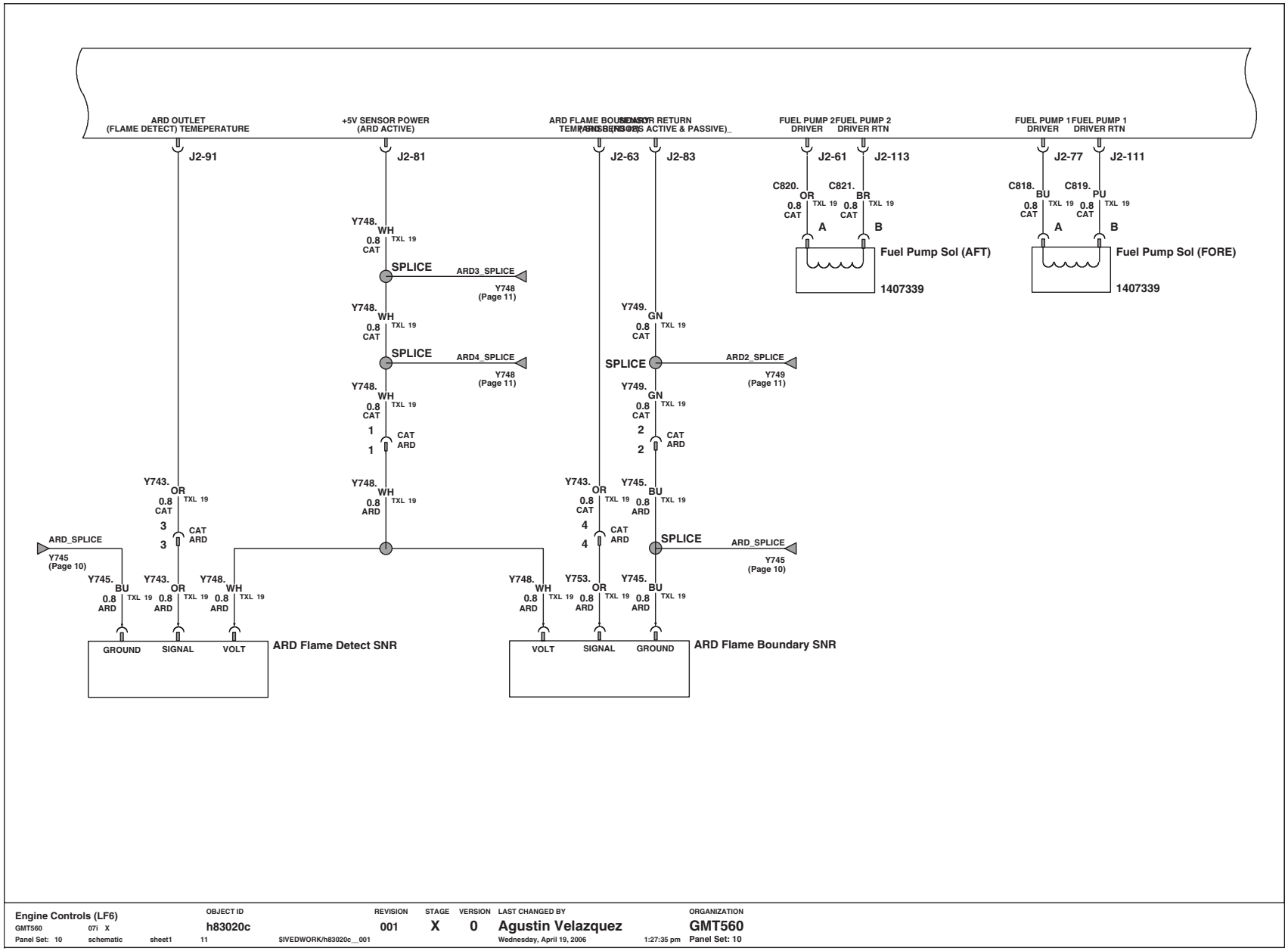
Engine Controls (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 07i X	h83020c	001	Prod	0	Agustin Velazquez	1:27:35 pm	GMT560
Panel Set: 8 schematic sheet1 11	$IVEDWORK/h83020c__001				Wednesday, April 19, 2006		Panel Set: 8

Engine Controls (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



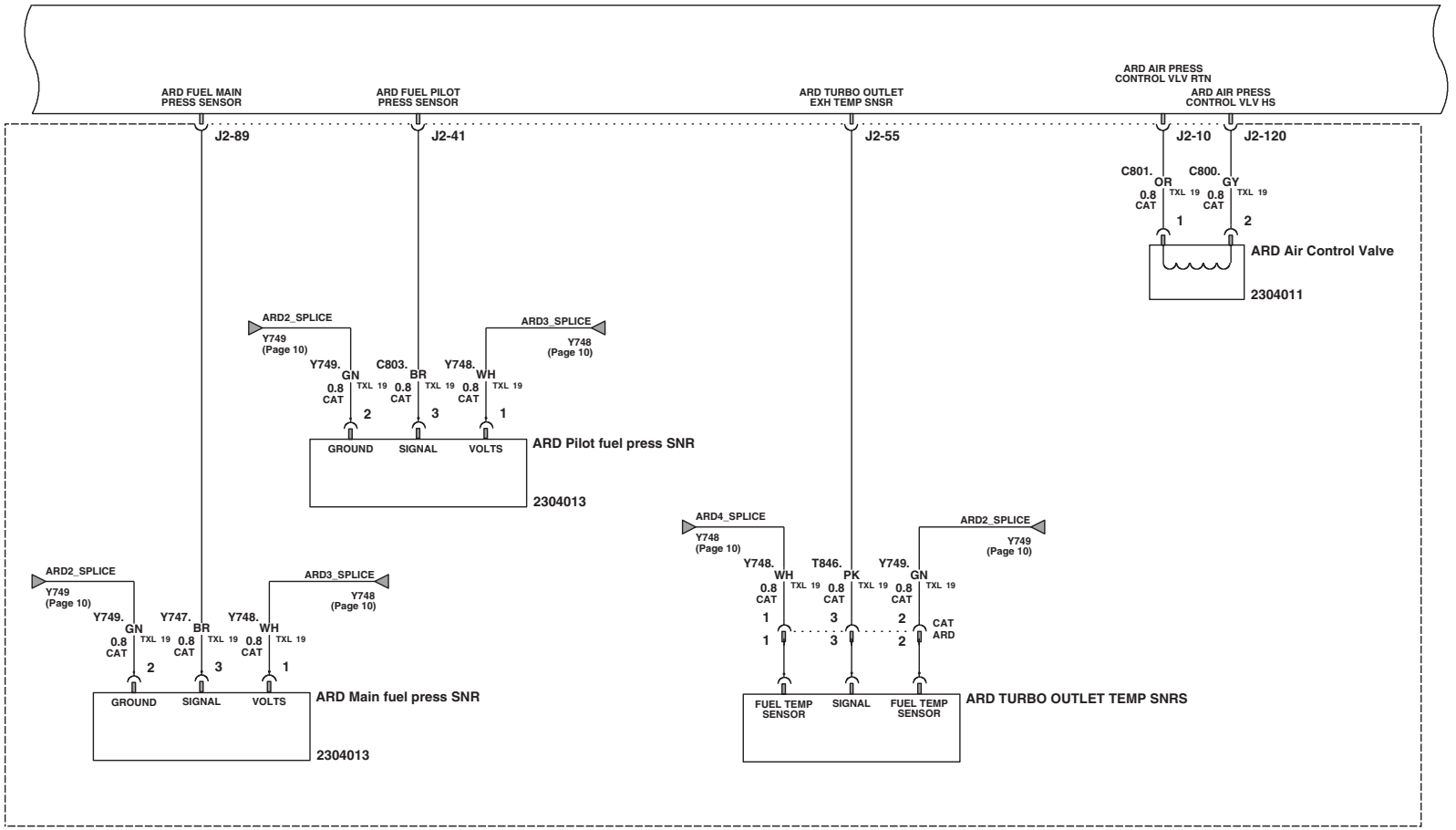
Engine Controls (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 07i X	h83020c	001	Prod	0	Agustin Velazquez	1:27:35 pm	GMT560
Panel Set: 9 schematic sheet1 11	$IVEDWORK/h83020c__001				Wednesday, April 19, 2006		Panel Set: 9

Engine Controls (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



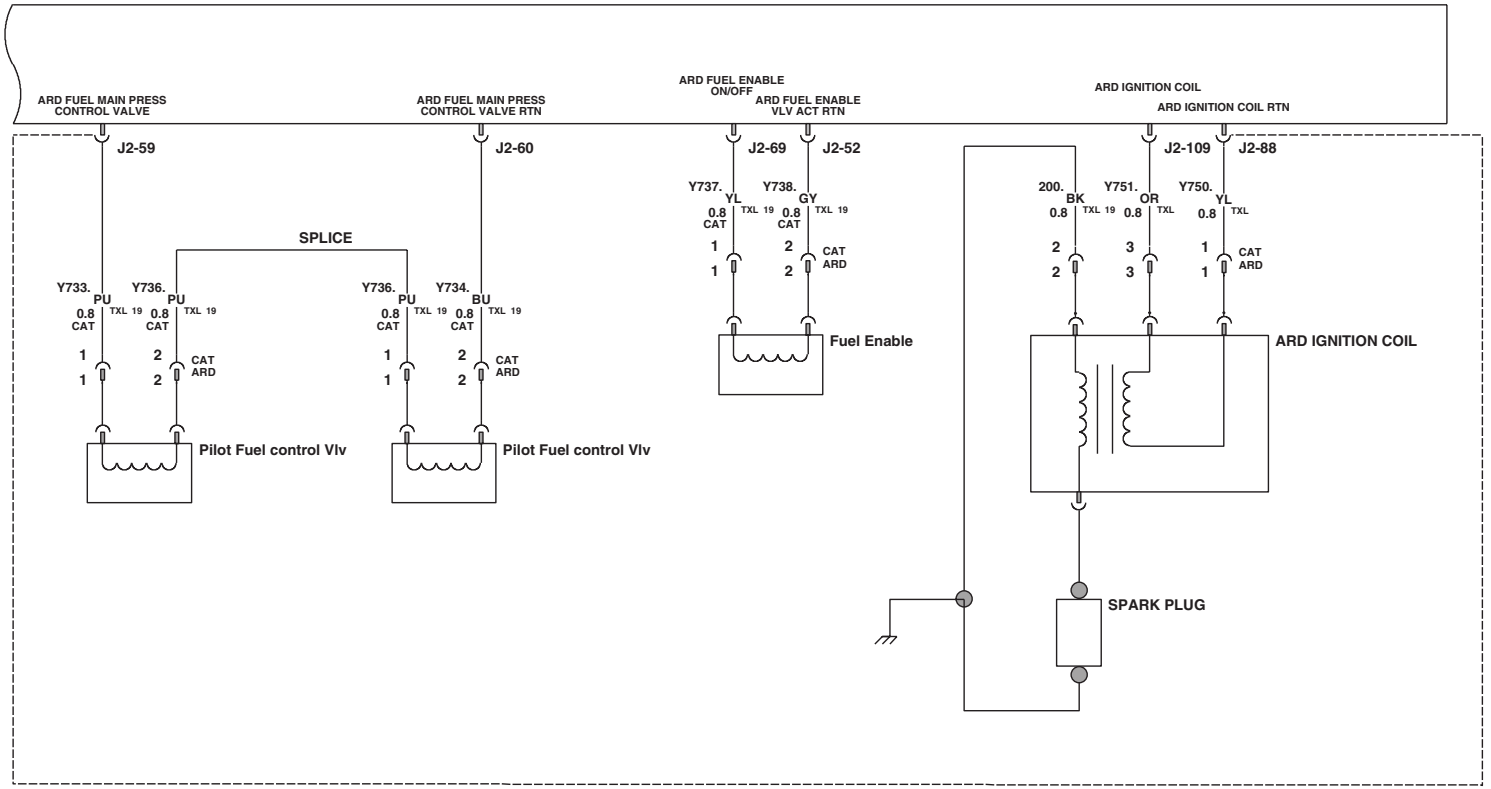
Engine Controls (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	ORGANIZATION
GMT560 07i X	h83020c	001	X	0	Agustin Velazquez	GMT560
Panel Set: 10 schematic sheet1 11	$IVEDWORK/h83020c__001				Wednesday, April 19, 2006 1:27:35 pm	Panel Set: 10

Engine Controls (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



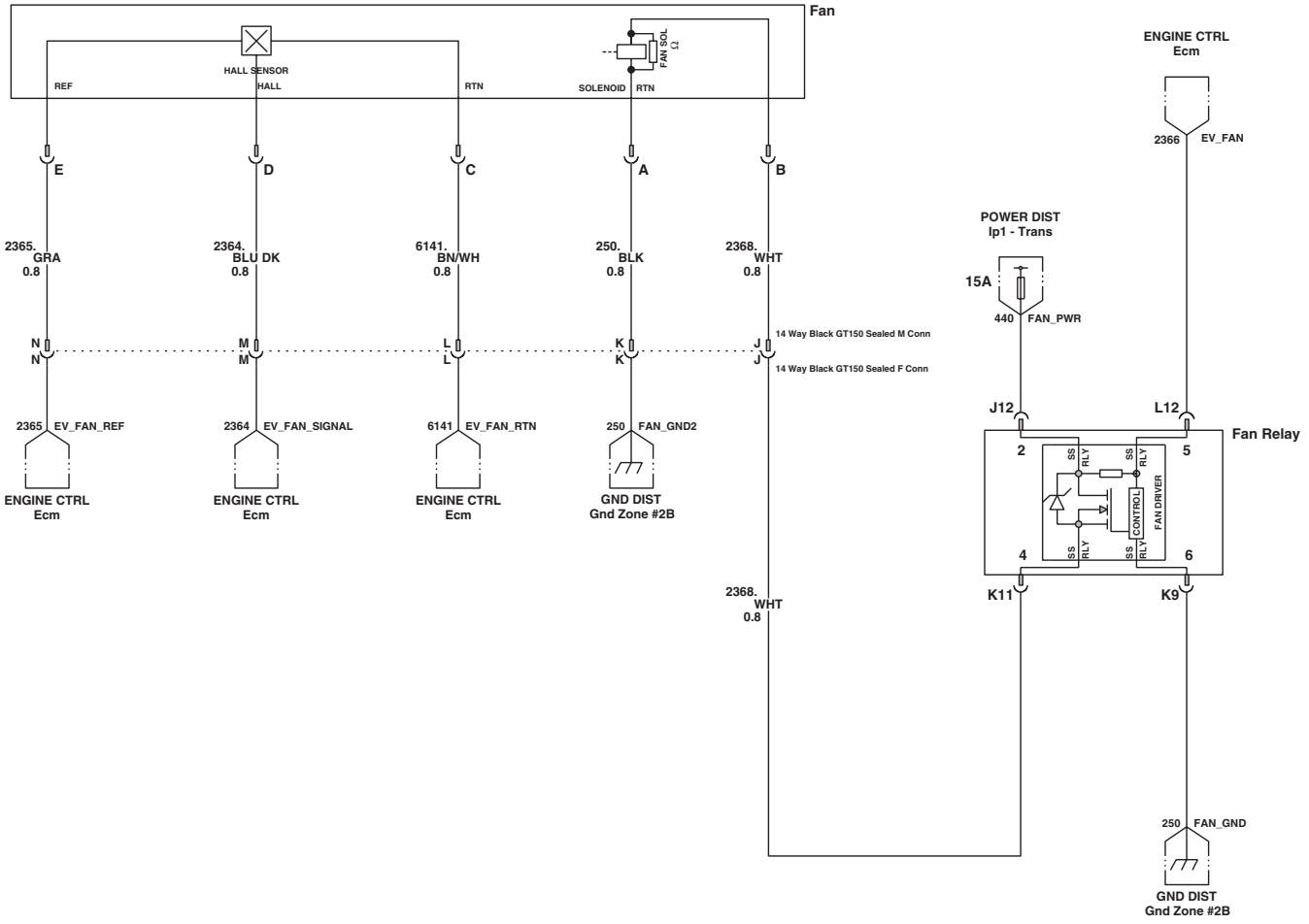
Engine Controls (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	ORGANIZATION
GMT560 07i X	h83020c	001	X	0	Agustin Velazquez	GMT560
Panel Set: 11 schematic sheet1 11	$IVEDWORK/h83020c__001				Wednesday, April 19, 2006 1:27:35 pm	

Engine Controls (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



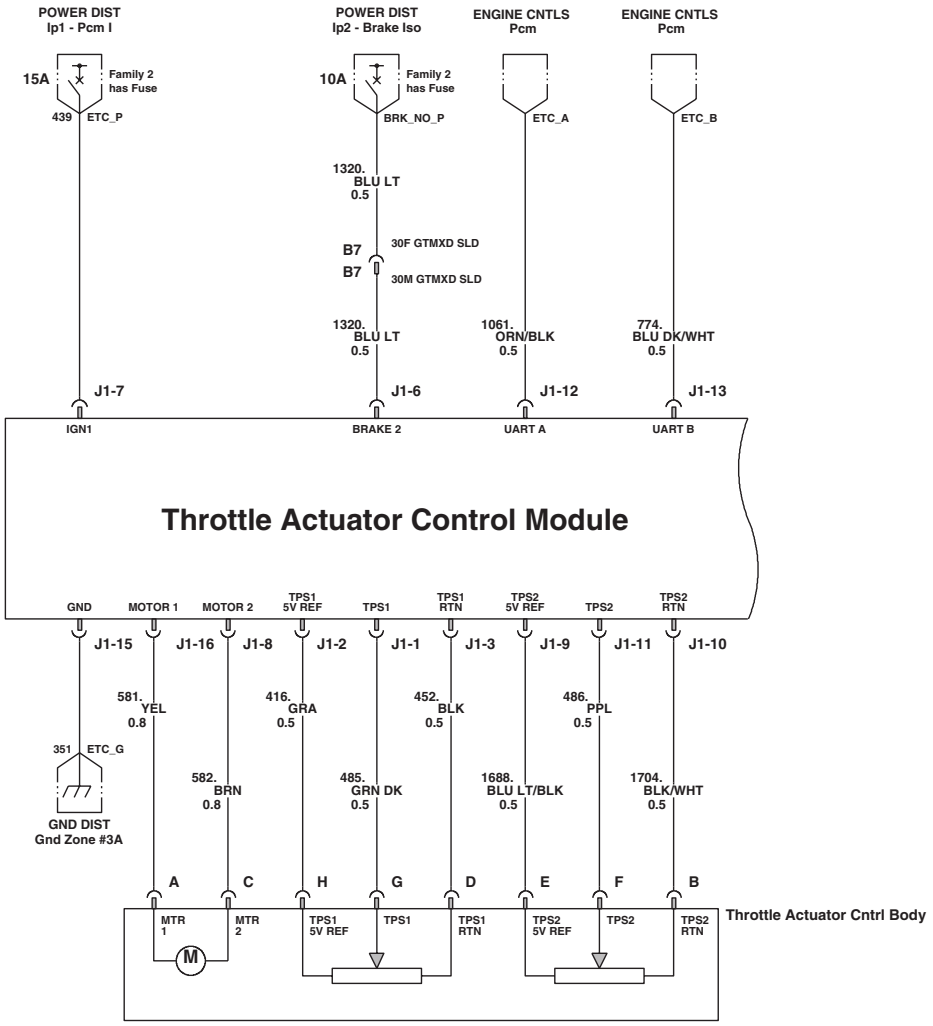
Engine Controls (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	ORGANIZATION
GMT560 07i X	h83020c	001	X	0	Agustin Velazquez	GMT560
Panel Set: 12 schematic sheet1 11	$IVEDWORK/h83020c__001				Wednesday, April 19, 2006 1:27:35 pm	

Fan Controls



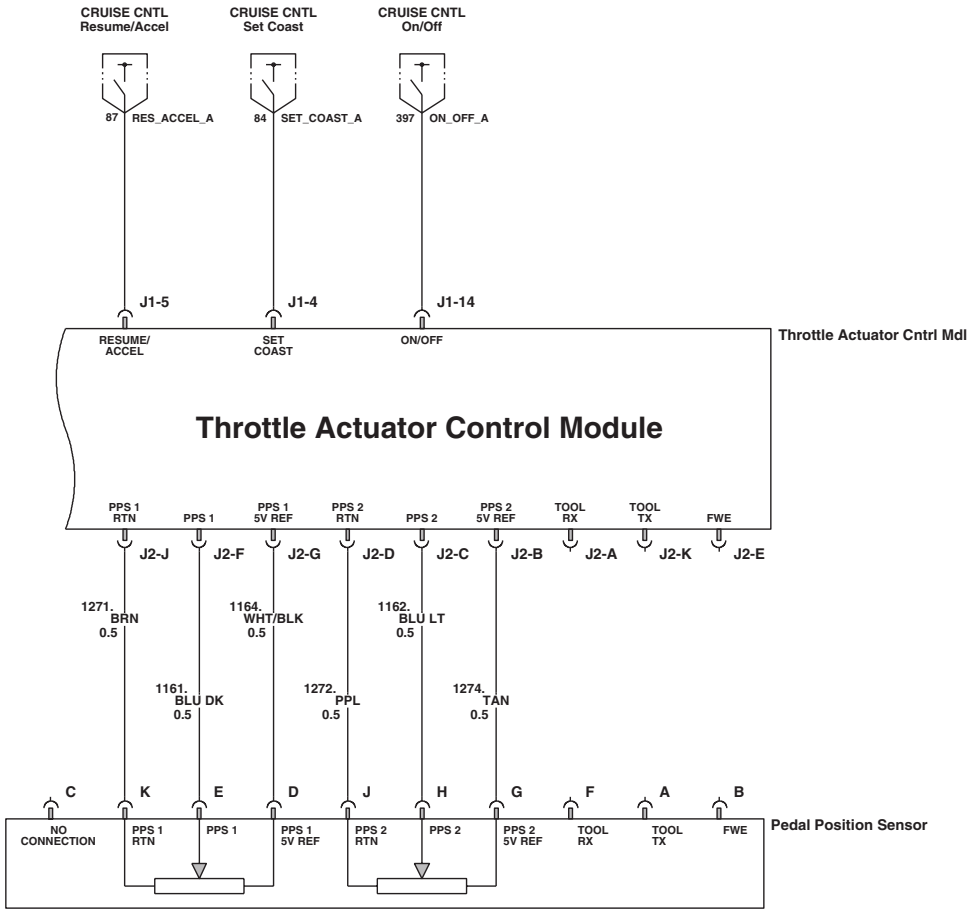
Fan Controls: MDD Fan			OBJECT ID		REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560	08 X		h83031a		001	X	0	Agustin Velazquez		GMT560
Panel Set: 1	schematic	sheet1 3	$IVEDWORK/h83031a__001					Wednesday, April 19, 2006	1:42:16 pm	Panel Set: 1

ETC (L18) 8.1L V8 GMPT VORTEC® - Gas



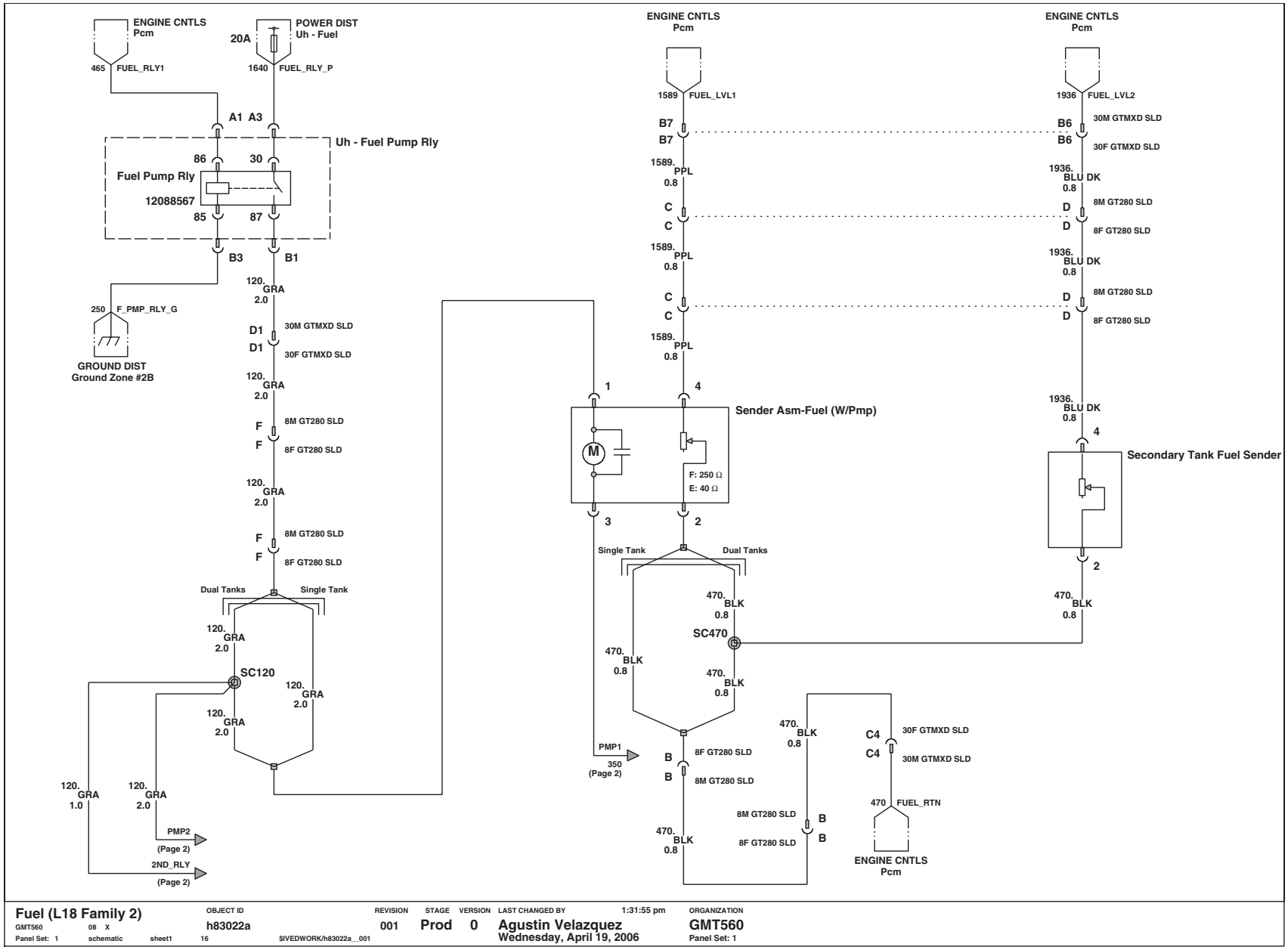
Etc L18		OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:31:30 pm	ORGANIZATION	
GMT560	08 X	h83021a	001	Pilot	0	Agustin Velazquez		GMT560	
Panel Set: 1	schematic sheet1 2	$IVEDWORK/h83021a__001				Wednesday, April 19, 2006		Panel Set: 1	

ETC (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)



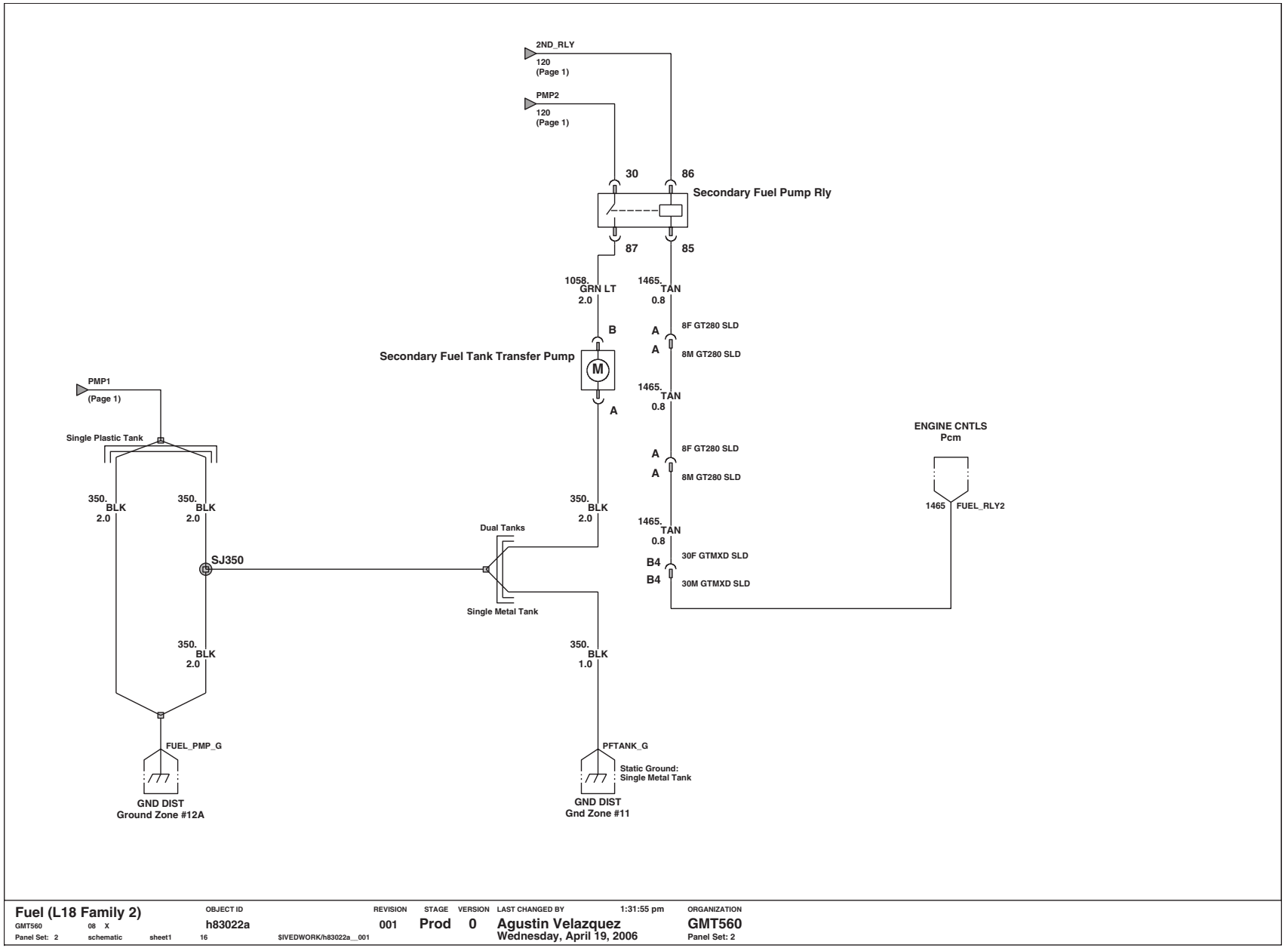
Etc L18		OBJECT ID		REVISION	STAGE	VERSION	LAST CHANGED BY	1:31:30 pm	ORGANIZATION
GMT560	08 X	h83021a		001	Pilot	0	Agustin Velazquez		GMT560
Panel Set: 2	schematic	sheet1	2	$IVEDWORK/h83021a__001			Wednesday, April 19, 2006		Panel Set: 2

Fuel (L18) 8.1L V8 GMPT VORTEC® - Gas - Family 2



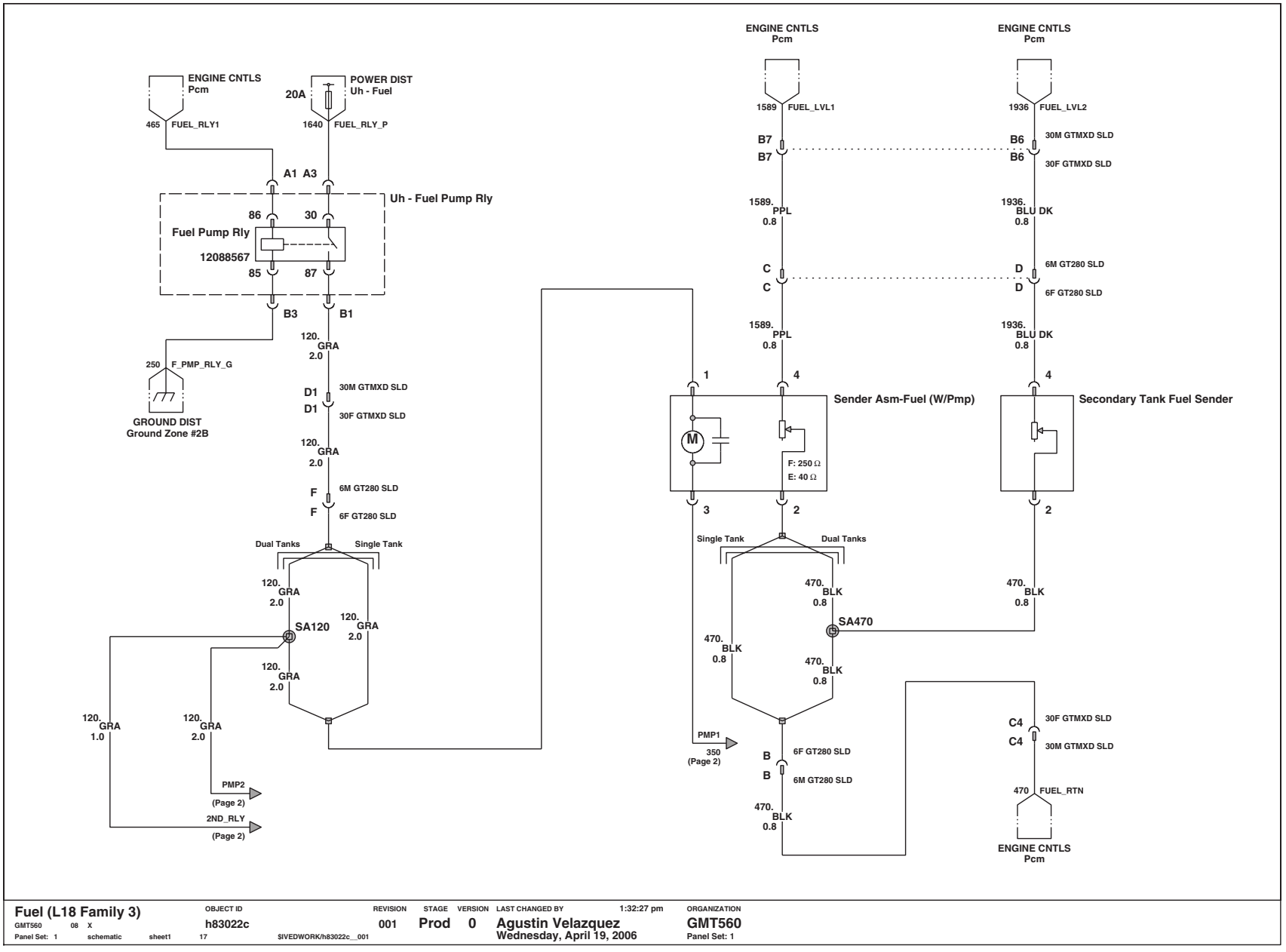
Fuel (L18 Family 2)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83022a	001	Prod	0	Agustin Velazquez	1:31:55 pm	GMT560
Panel Set: 1 schematic sheet1 16	SIVEDWORK/h83022a__001				Wednesday, April 19, 2006		Panel Set: 1

Fuel (L18) 8.1L V8 GMPT VORTEC® - Gas - Family 2



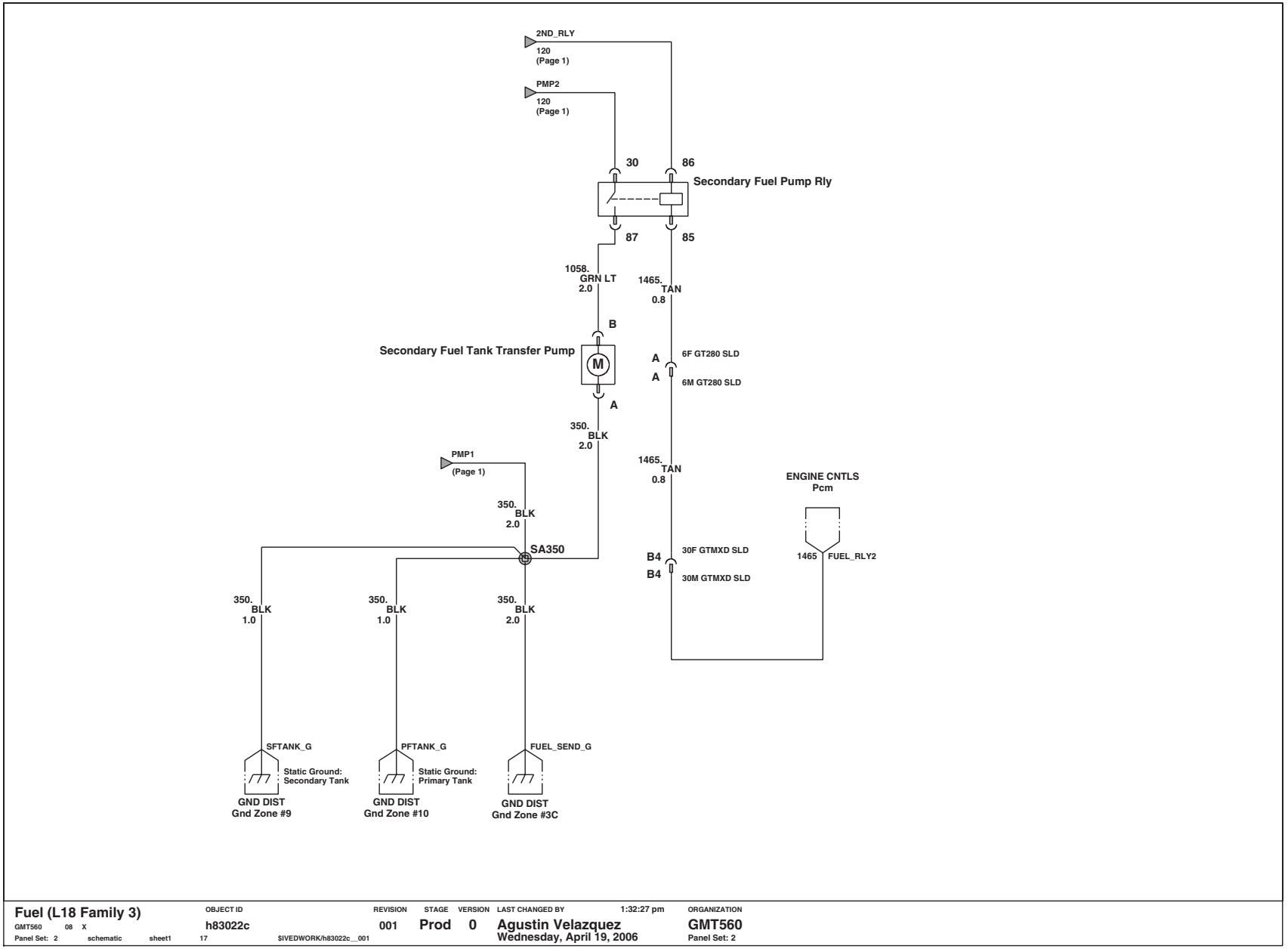
Fuel (L18 Family 2)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:31:55 pm	ORGANIZATION
GMT560 08 X	h83022a	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 2 schematic sheet1 16	$IVEDWORK/h83022a__001				Wednesday, April 19, 2006		Panel Set: 2

Fuel (L18) 8.1L V8 GMPT VORTEC® - Gas - Family 3



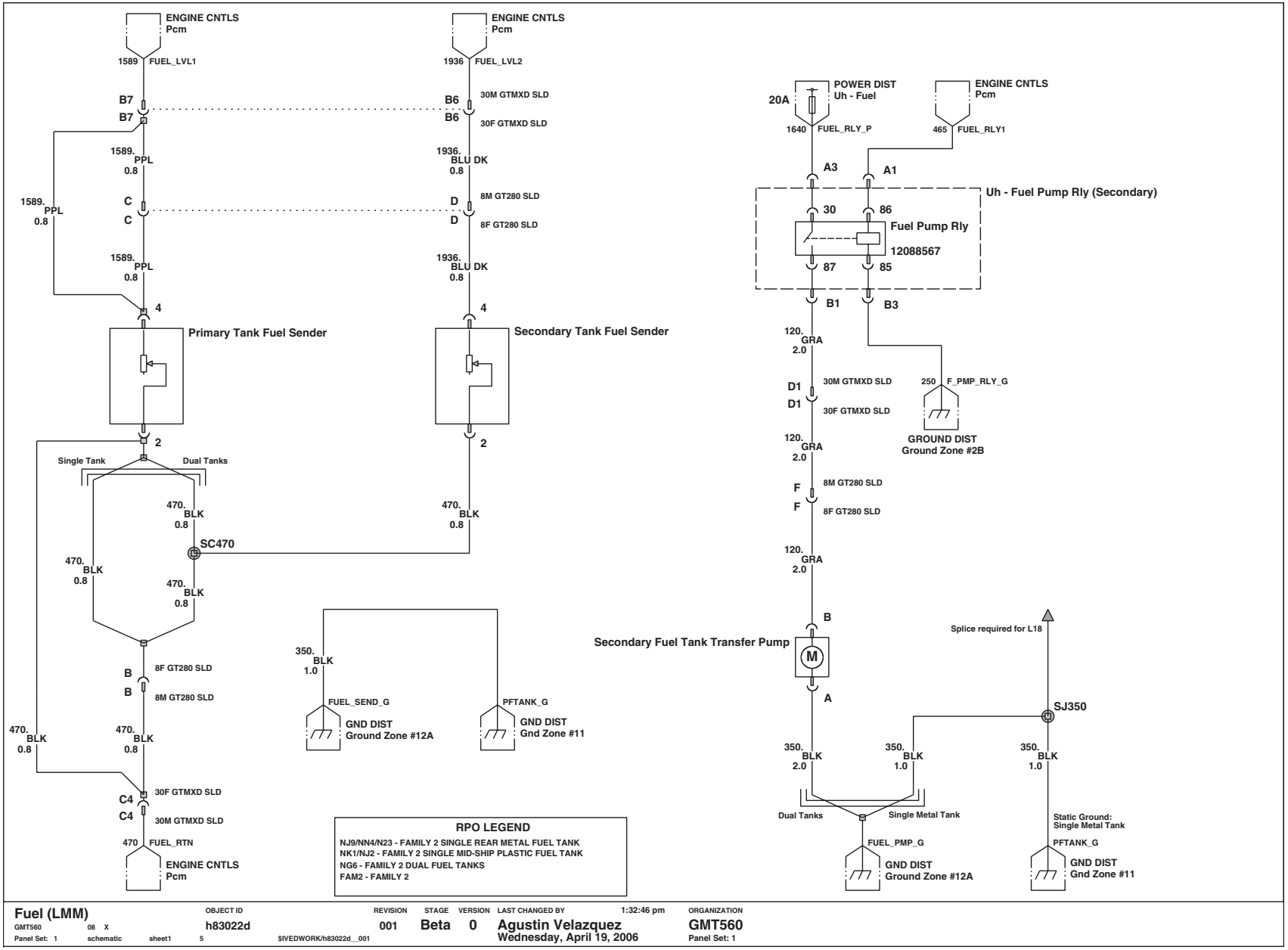
Fuel (L18 Family 3)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83022c	001	Prod	0	Agustin Velazquez	1:32:27 pm	GMT560
Panel Set: 1 schematic sheet1 17	$IVEDWORK/h83022c__001				Wednesday, April 19, 2006		Panel Set: 1

Fuel (L18) 8.1L V8 GMPT VORTEC® - Gas - Family 3



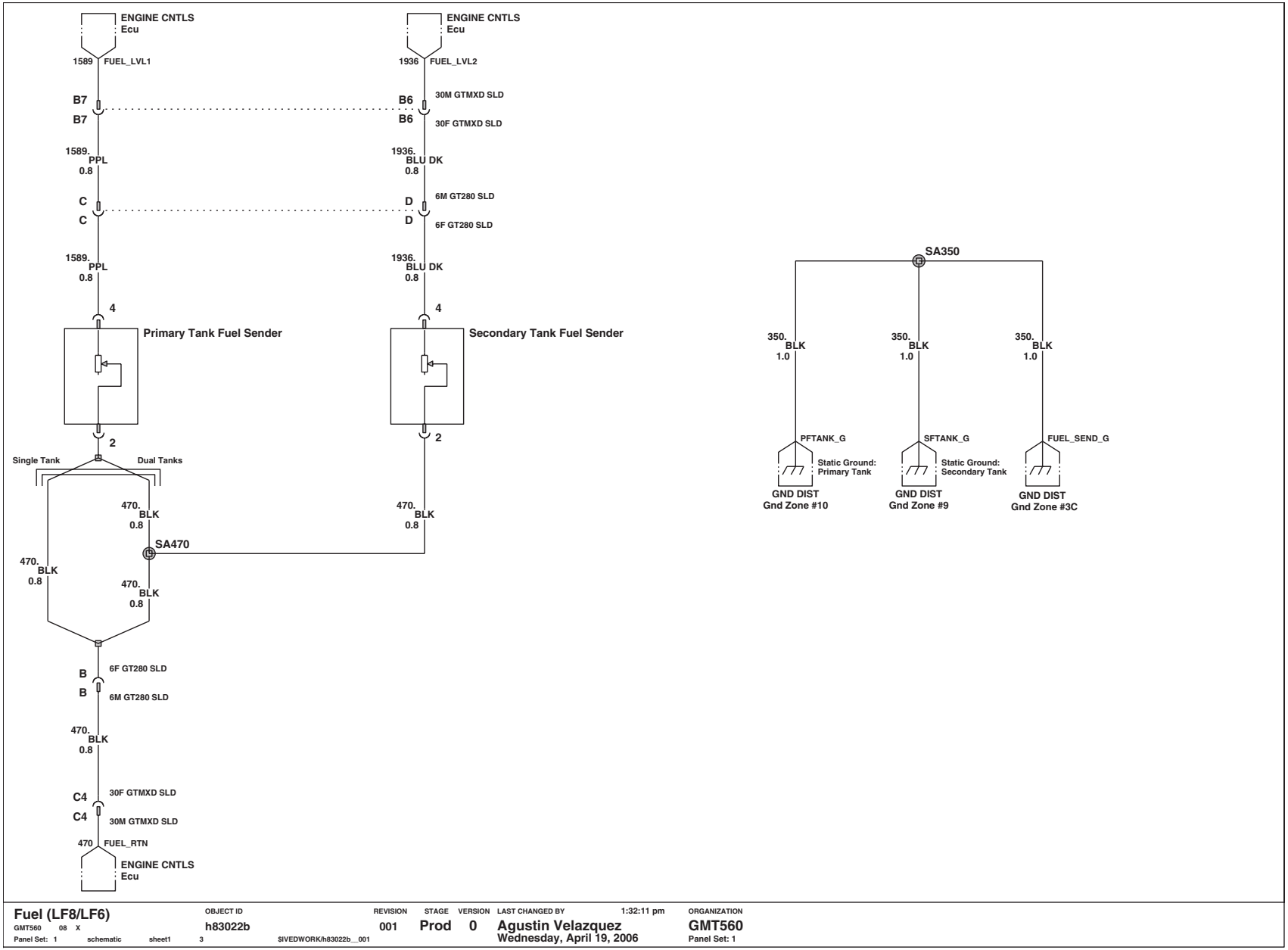
Fuel (L18 Family 3)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:32:27 pm	ORGANIZATION
GMT560 08 X	h83022c	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 2 schematic sheet1 17	$IVEDWORK/h83022c__001				Wednesday, April 19, 2006		Panel Set: 2

Fuel (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel



Fuel (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:32:46 pm	ORGANIZATION
GMT560 08 X	h83022d	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 5	$IVEDWORK/h83022d__001				Wednesday, April 19, 2006		Panel Set: 1

Fuel (LF8) 7.8L L6 Isuzu 6H - Diesel – (LF6) 7.2L L6 Caterpillar® C7 - Diesel



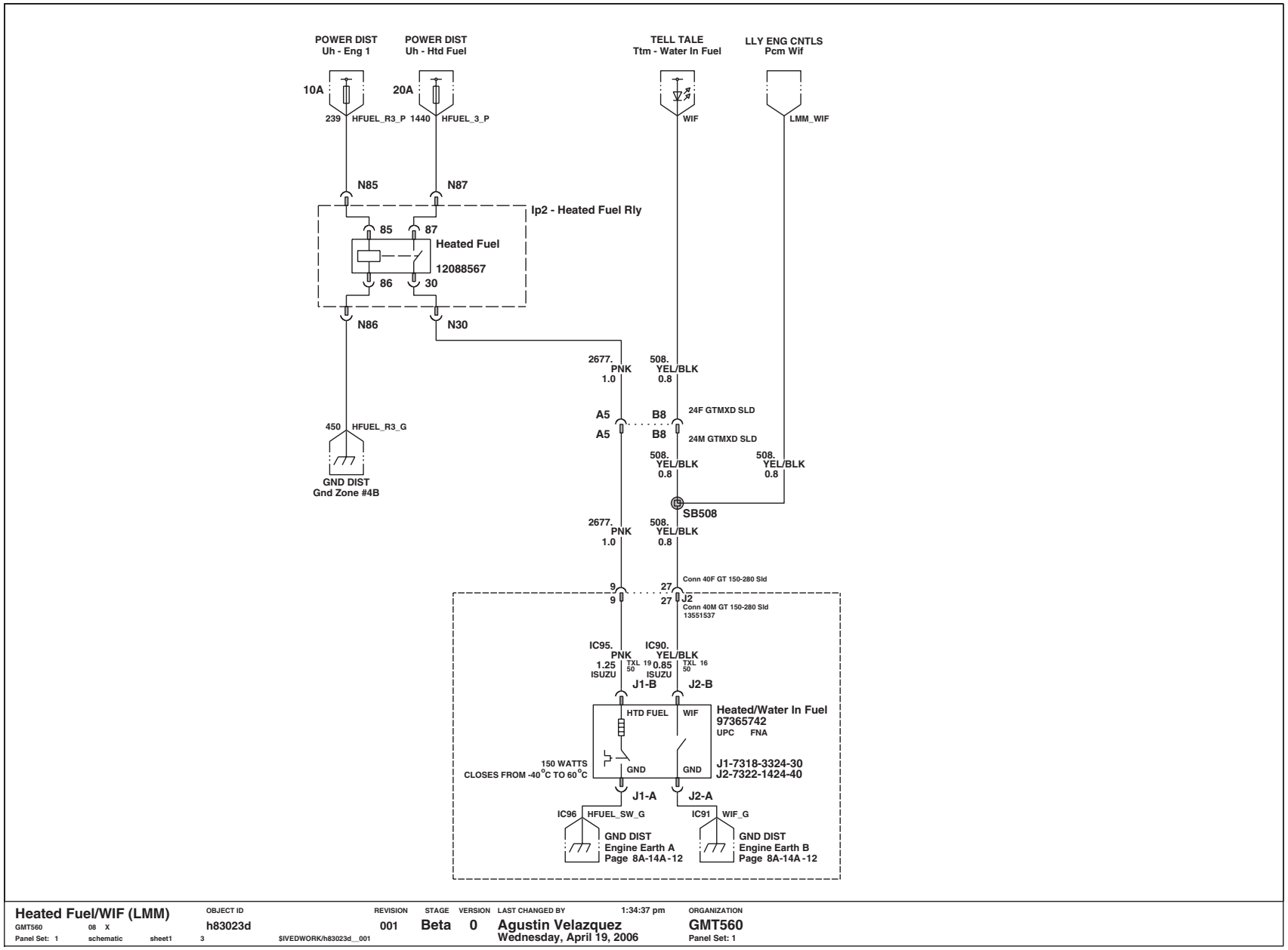
Fuel (LF8/LF6)
GMT560 08 X
Panel Set: 1 schematic sheet1 3

OBJECT ID: h83022b
$IVEDWORK/h83022b__001

REVISION: 001
STAGE: Prod
VERSION: 0
LAST CHANGED BY: Agustin Velazquez
1:32:11 pm
Wednesday, April 19, 2006

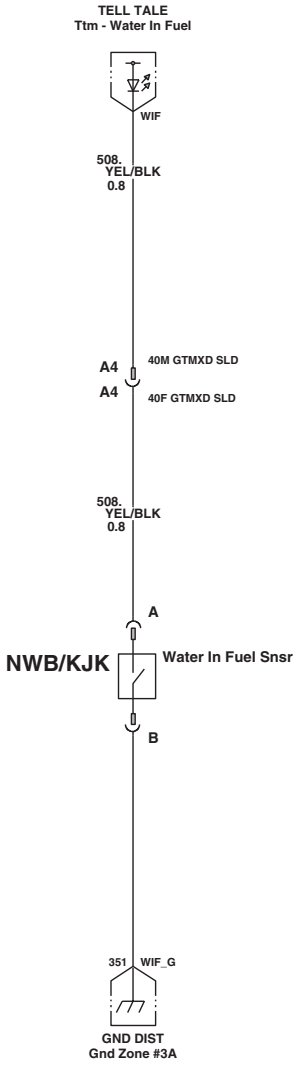
ORGANIZATION: GMT560
Panel Set: 1

Heated Fuel - Water In Fuel (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel



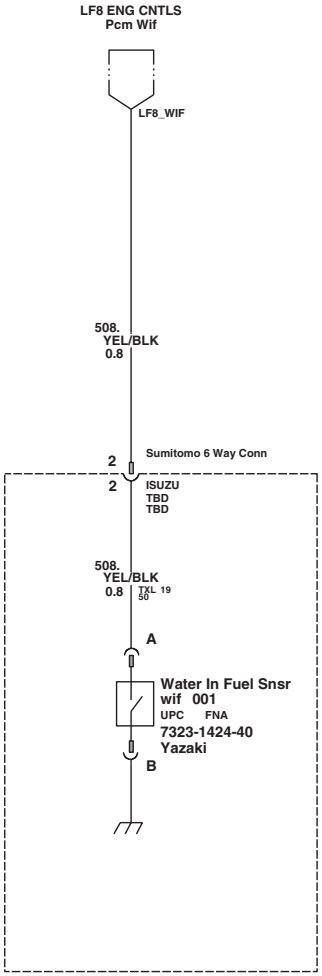
Heated Fuel/WIF (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83023d	001	Beta	0	Agustin Velazquez	1:34:37 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83023d__001				Wednesday, April 19, 2006		Panel Set: 1

Heated Fuel - Water In Fuel (LF6) 7.2L L6 Caterpillar® C7 - Diesel



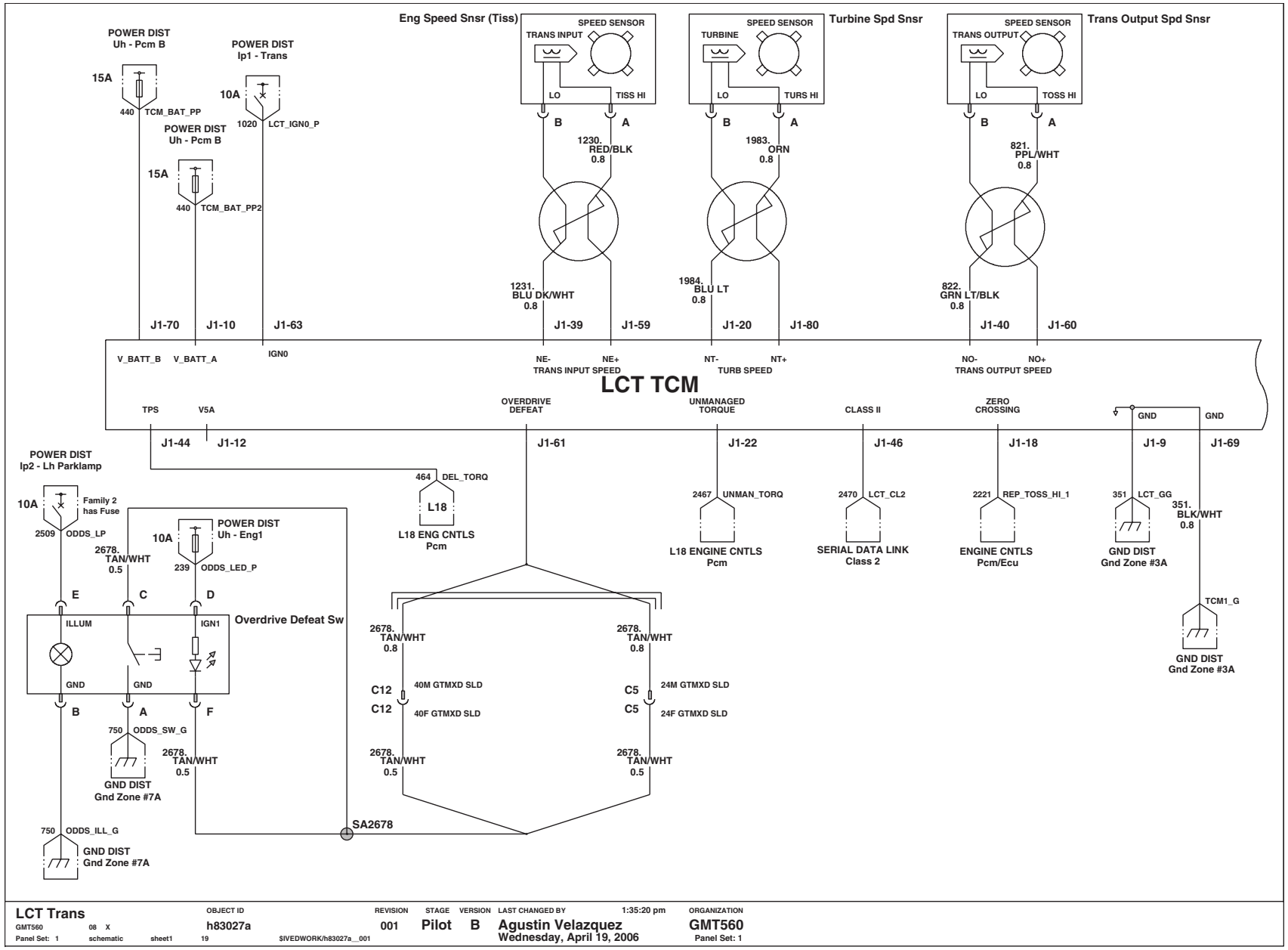
Heated Fuel/WIF (LF6)	OBJECT ID		REVISION	STAGE	VERSION	LAST CHANGED BY	1:34:18 pm	ORGANIZATION
GMT560 08 X	**h83023c**		001	**Prod**	**0**	**Agustin Velazquez**		**GMT560**
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83023c__001					**Wednesday, April 19, 2006**		Panel Set: 1

Heated Fuel - Water In Fuel (LF8) 7.8L L6 Isuzu 6H - Diesel

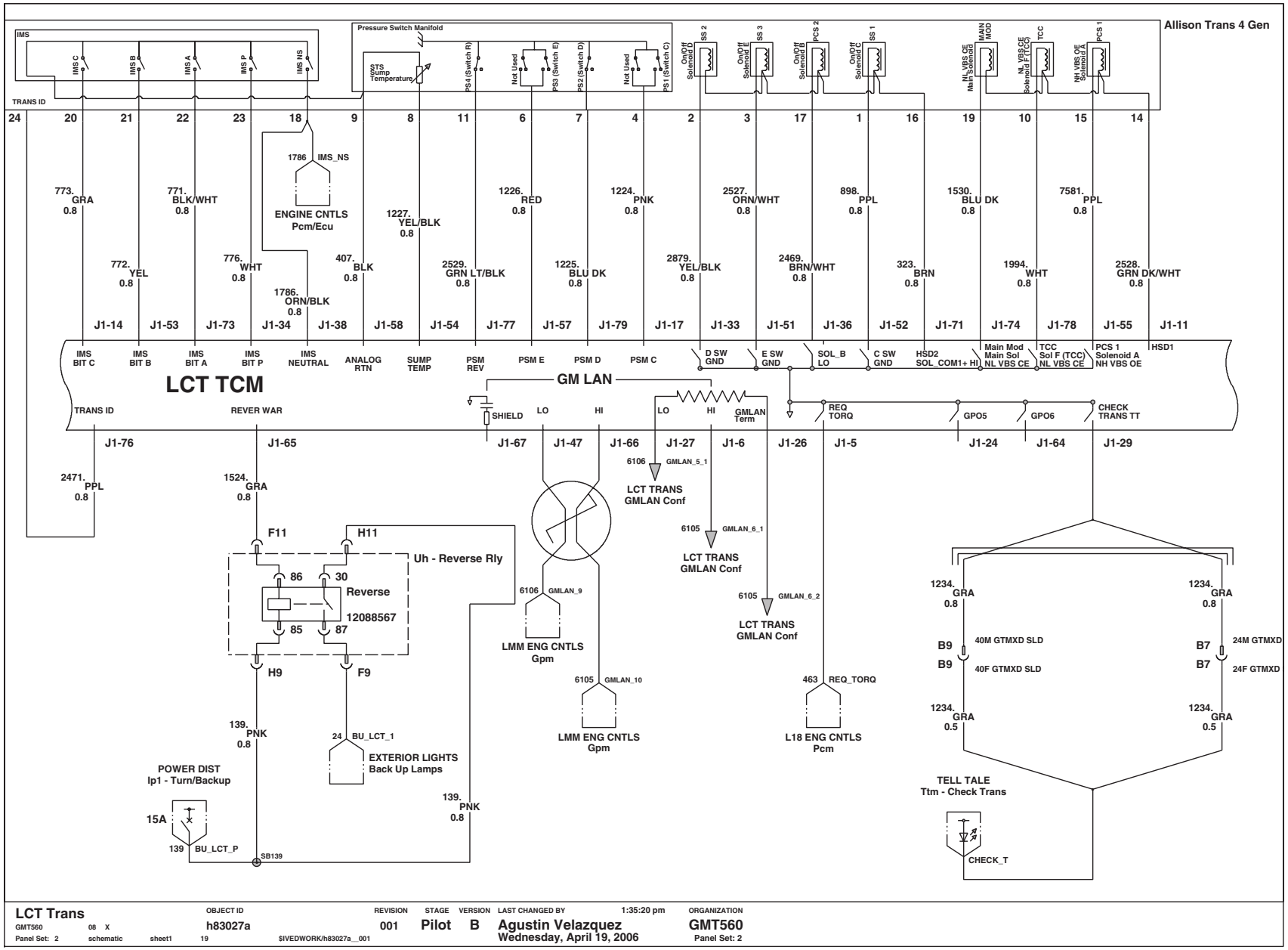


Heated Fuel/WIF (LF8)	OBJECT ID		REVISION	STAGE	VERSION	LAST CHANGED BY	1:34:00 pm	ORGANIZATION
GMT560 08 X	**h83023b**		**001**	**Beta**	**0**	**Agustin Velazquez**		**GMT560**
Panel Set: 1 schematic sheet1 4	$IVEDWORK/h83023b__001					**Wednesday, April 19, 2006**		Panel Set: 1

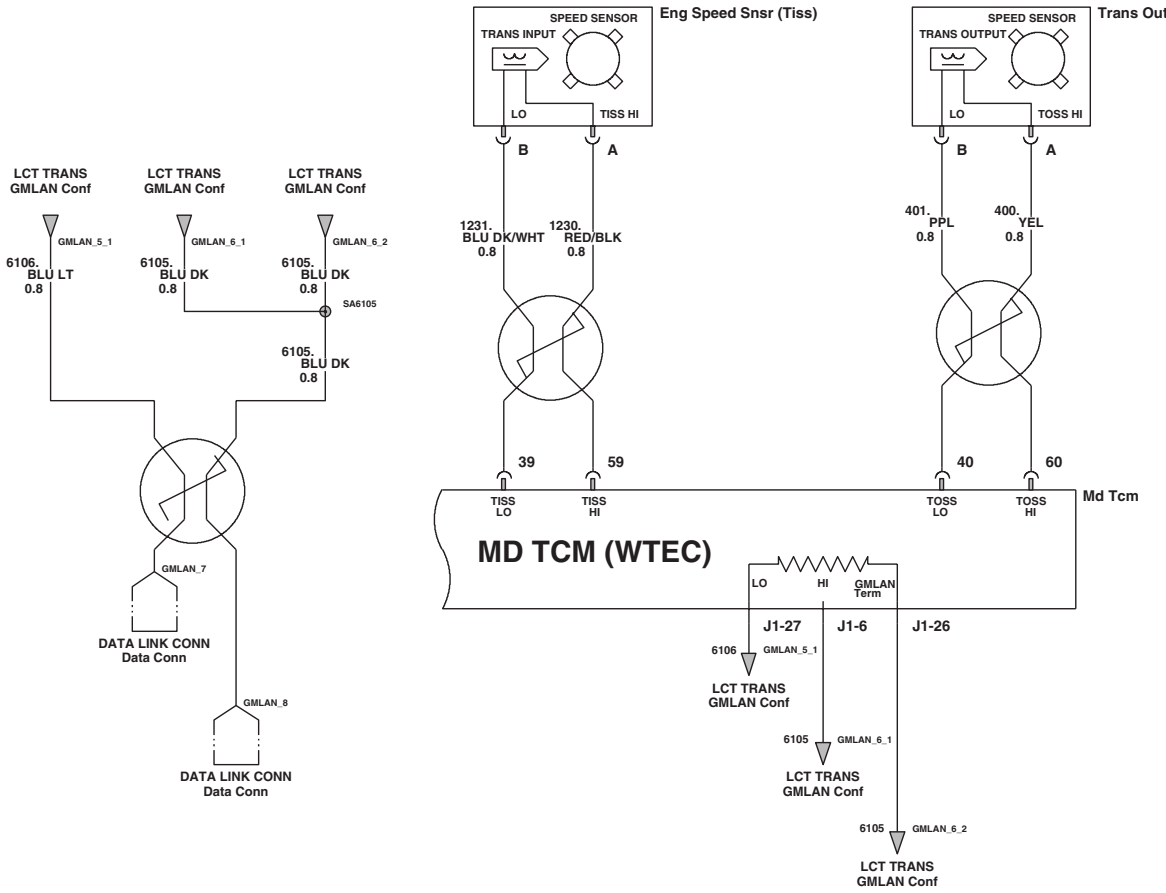
Automatic Transmission (LCT) Transmission Control Module



Automatic Transmission (LCT) Transmission Control Module

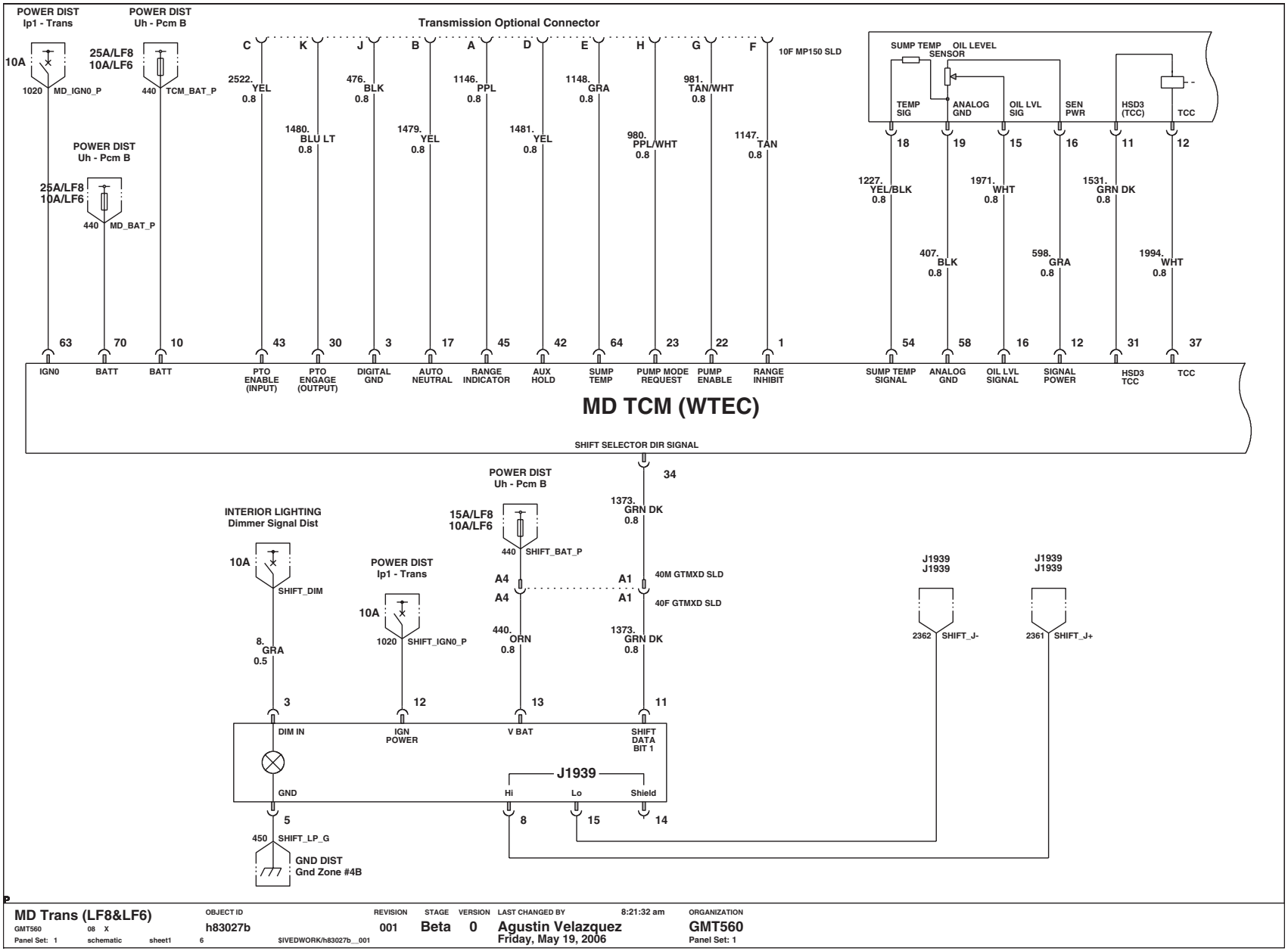


Automatic Transmission (LCT) Transmission Control Module



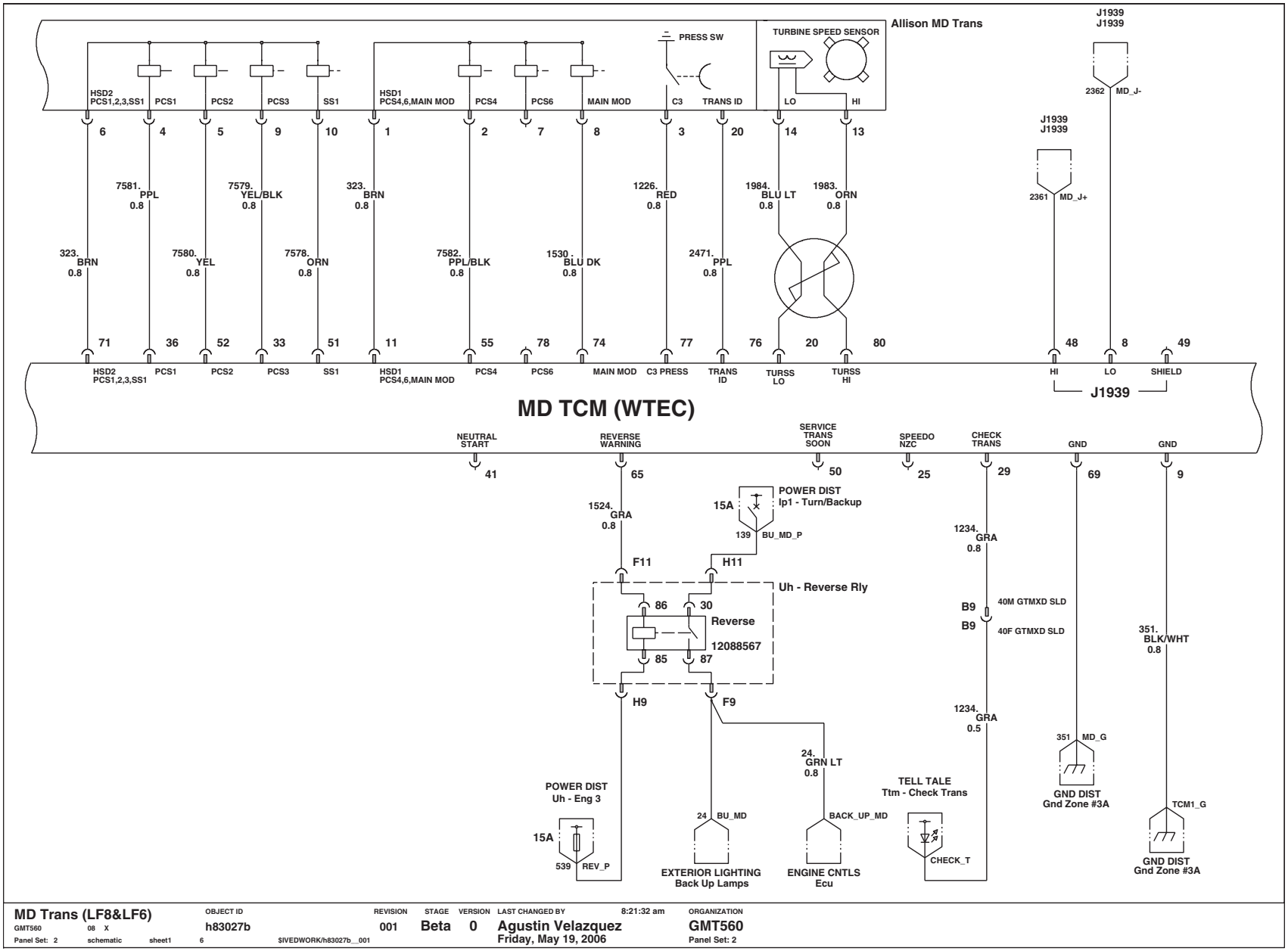
MD Trans (LF8&LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83027b	001	Beta	0	Agustin Velazquez	8:21:32 am	GMT560
Panel Set: 3 schematic sheet1 6	$IVEDWORK/h83027b__001				Friday, May 19, 2006		Panel Set: 3

Automatic Transmission (MD) Transmission Control Module



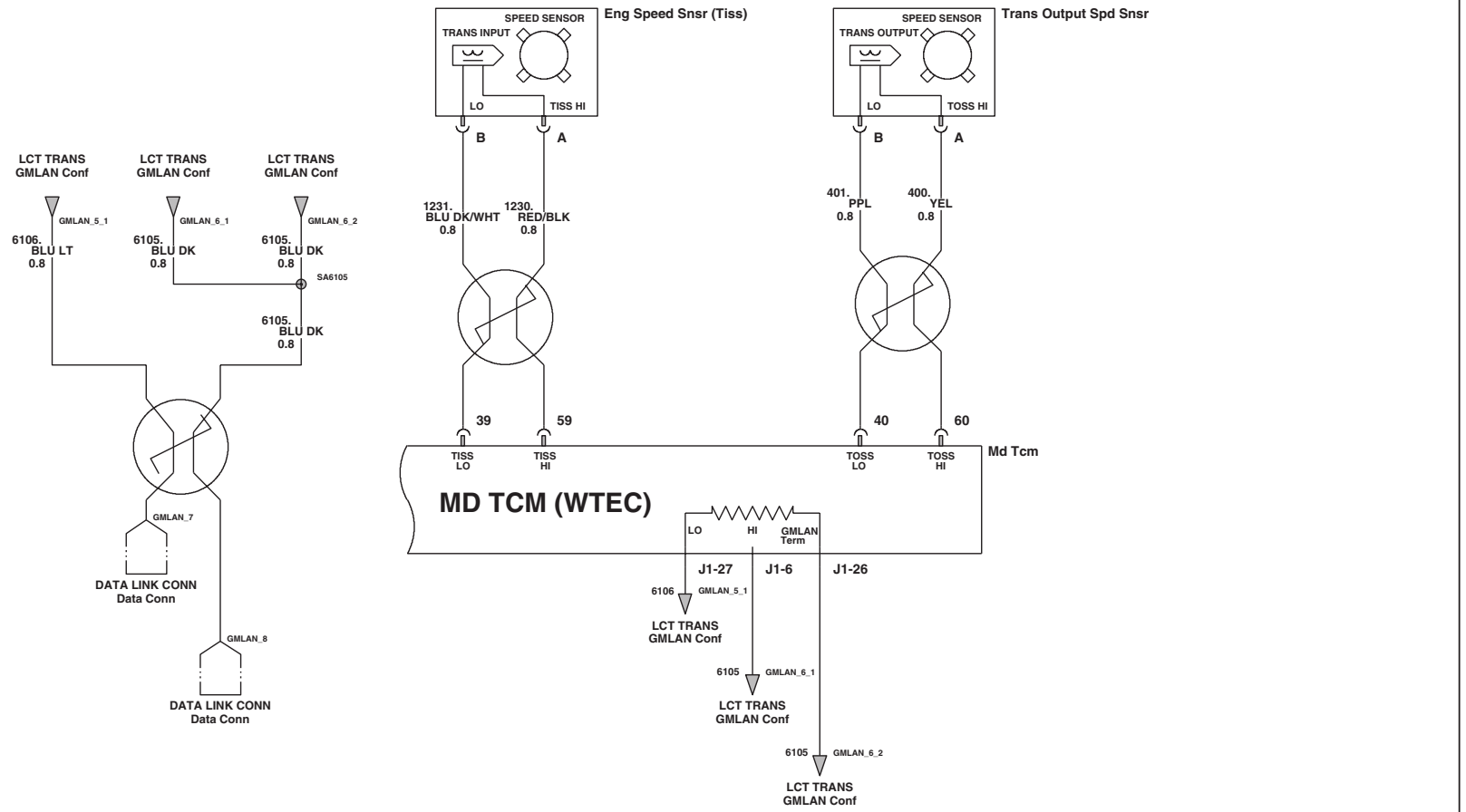
MD Trans (LF8&LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83027b	001	Beta	0	Agustin Velazquez	8:21:32 am	GMT560
Panel Set: 1 schematic sheet1 6	$IVEDWORK/h83027b__001				Friday, May 19, 2006		Panel Set: 1

Automatic Transmission (MD) Transmission Control Module (continued)



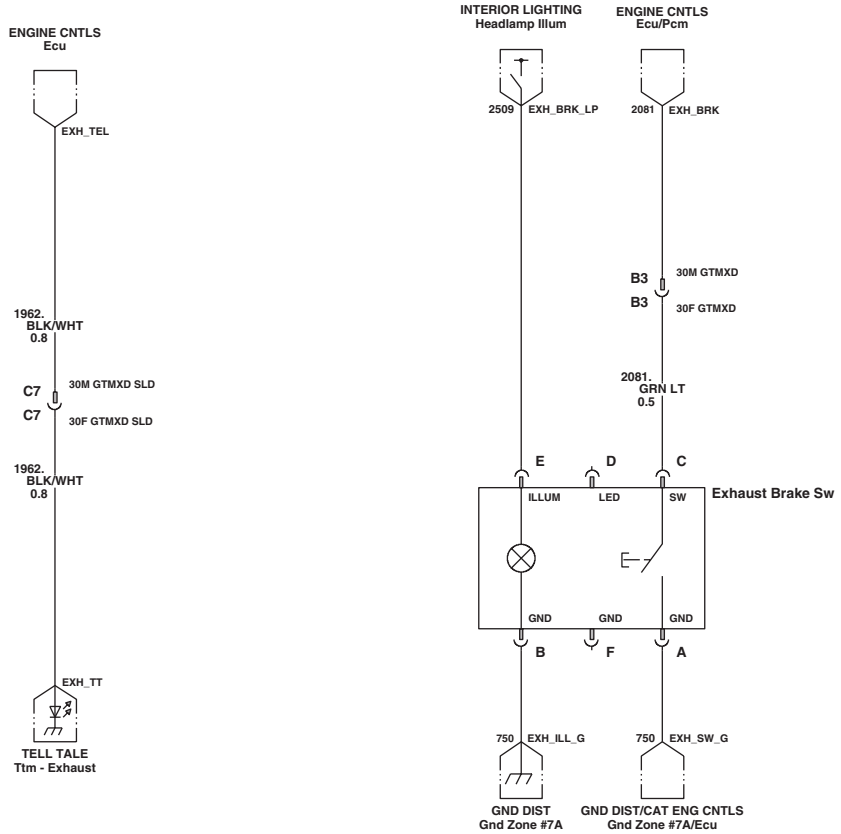
MD Trans (LF8&LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83027b	001	Beta	0	Agustin Velazquez	8:21:32 am	GMT560
Panel Set: 2 schematic sheet1 6	$IVEDWORK/h83027b__001				Friday, May 19, 2006		Panel Set: 2

Automatic Transmission (MD) Transmission Control Module (continued)



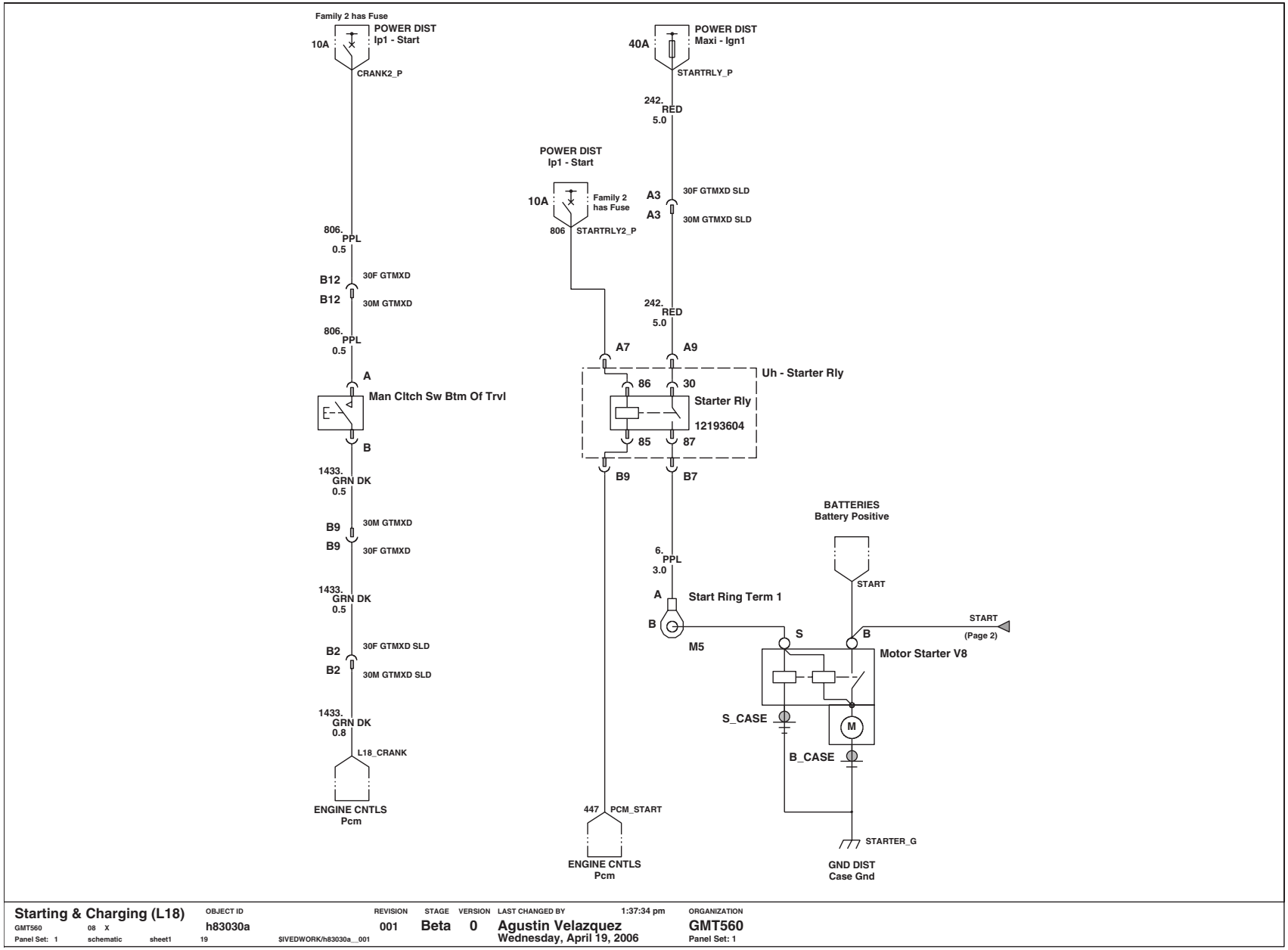
MD Trans (LF8&LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	8:21:32 am	ORGANIZATION
GMT560 08 X	h83027b	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 3 schematic sheet1 6	$IVEDWORK/h83027b__001				Friday, May 19, 2006		Panel Set: 3

Exhaust Brake/Restrictor (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel – (LF8) 7.8L L6 Isuzu 6H - Diesel – (LF6) 7.2L L6 Caterpillar® C7 - Diesel



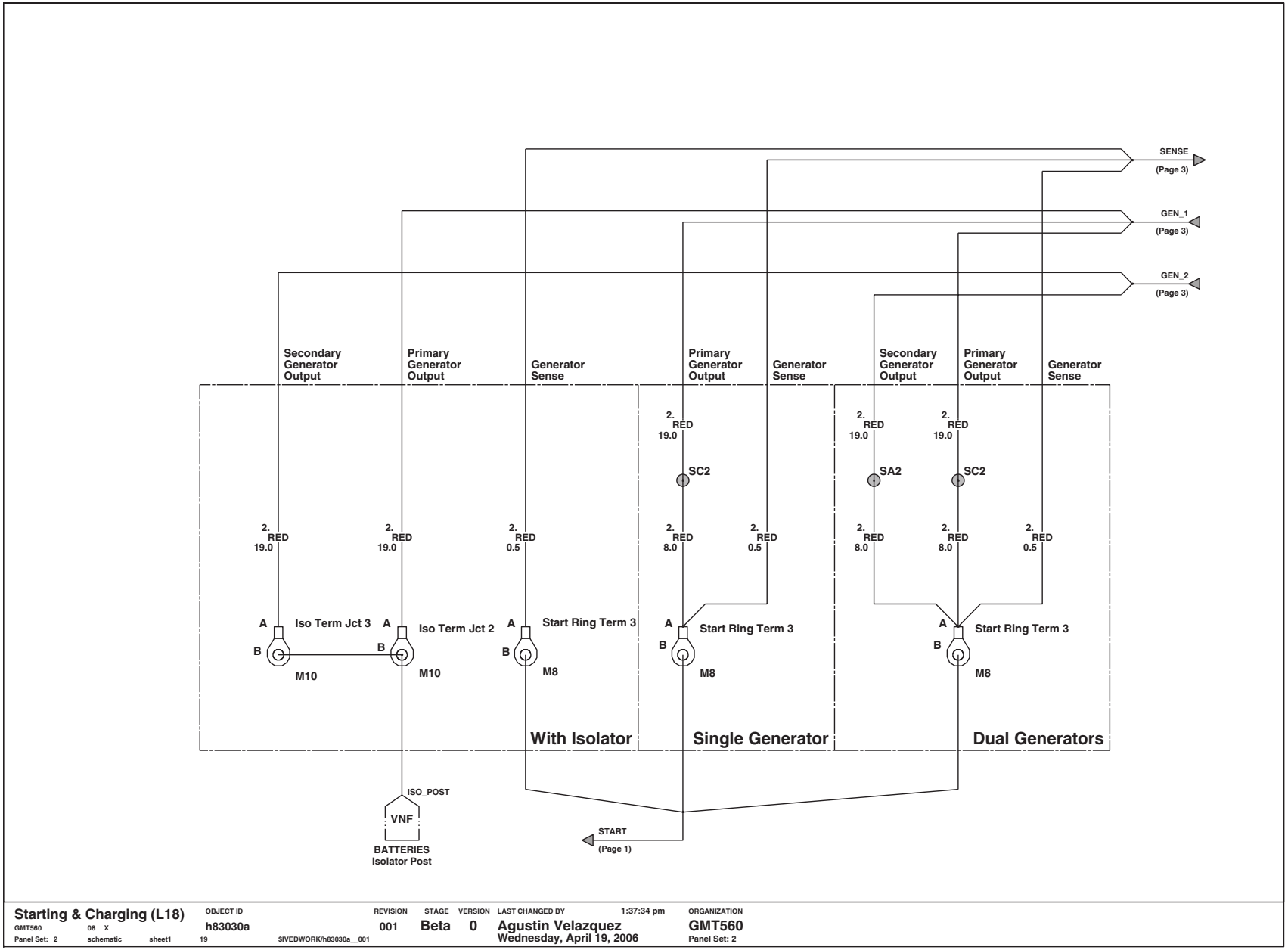
Exhaust Brake/Rstr (Diesel)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:36:59 pm	ORGANIZATION
GMT560 08 X	h83029a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 4	$IVEDWORK/h83029a__001				Wednesday, April 19, 2006		Panel Set: 1

Starting & Charging (L18) 8.1L V8 GMPT VORTEC® - Gas



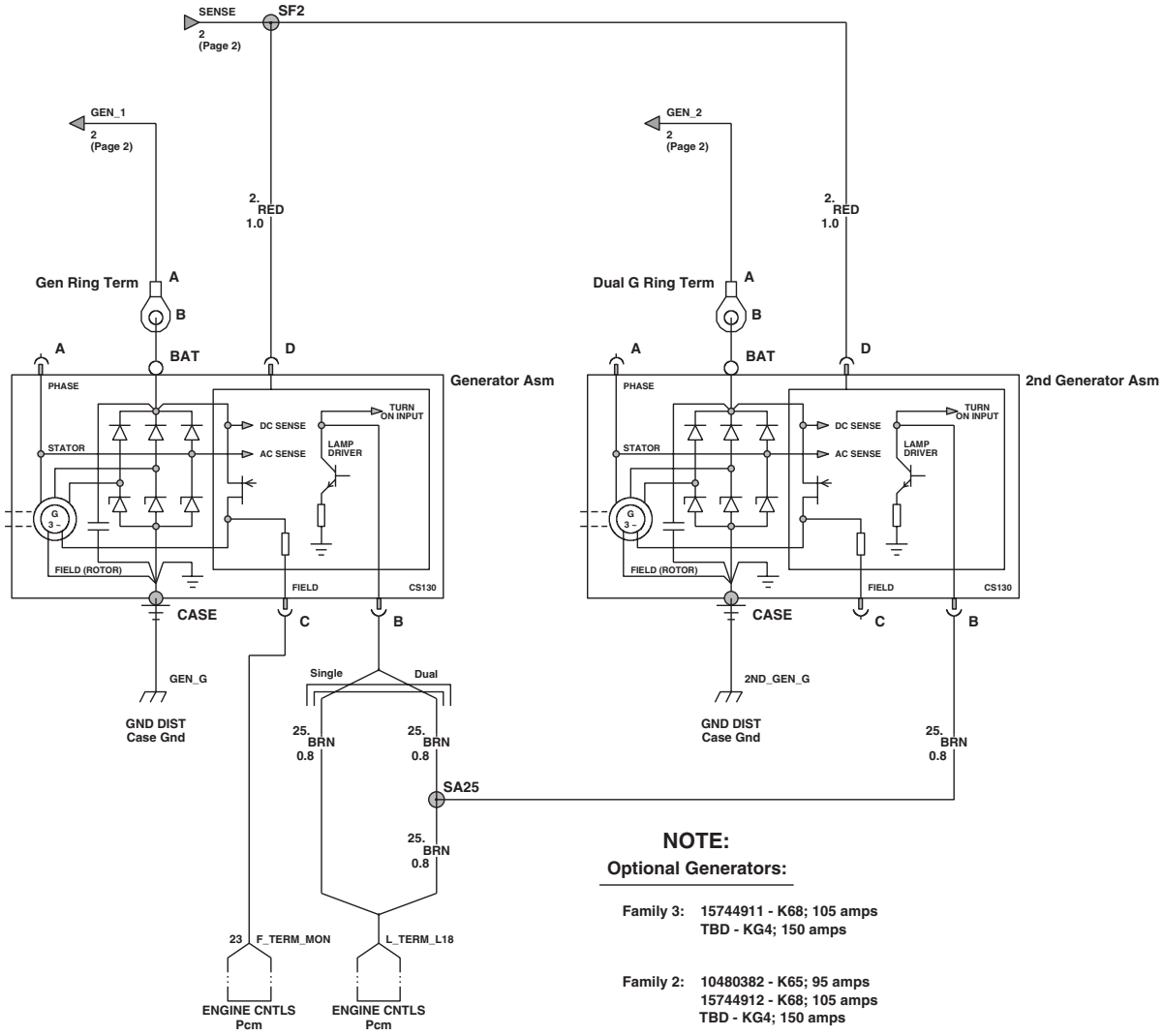
Starting & Charging (L18)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83030a	001	Beta	0	Agustin Velazquez	1:37:34 pm	GMT560
Panel Set: 1 schematic sheet1 19	$IVEDWORK/h83030a__001				Wednesday, April 19, 2006		Panel Set: 1

Starting & Charging (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)



Starting & Charging (L18)	OBJECT ID		REVISION	STAGE	VERSION	LAST CHANGED BY	1:37:34 pm	ORGANIZATION
GMT560	08 X	h83030a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 2	schematic	sheet1 19	$IVEDWORK/h83030a__001			Wednesday, April 19, 2006		Panel Set: 2

Starting & Charging (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)



NOTE:

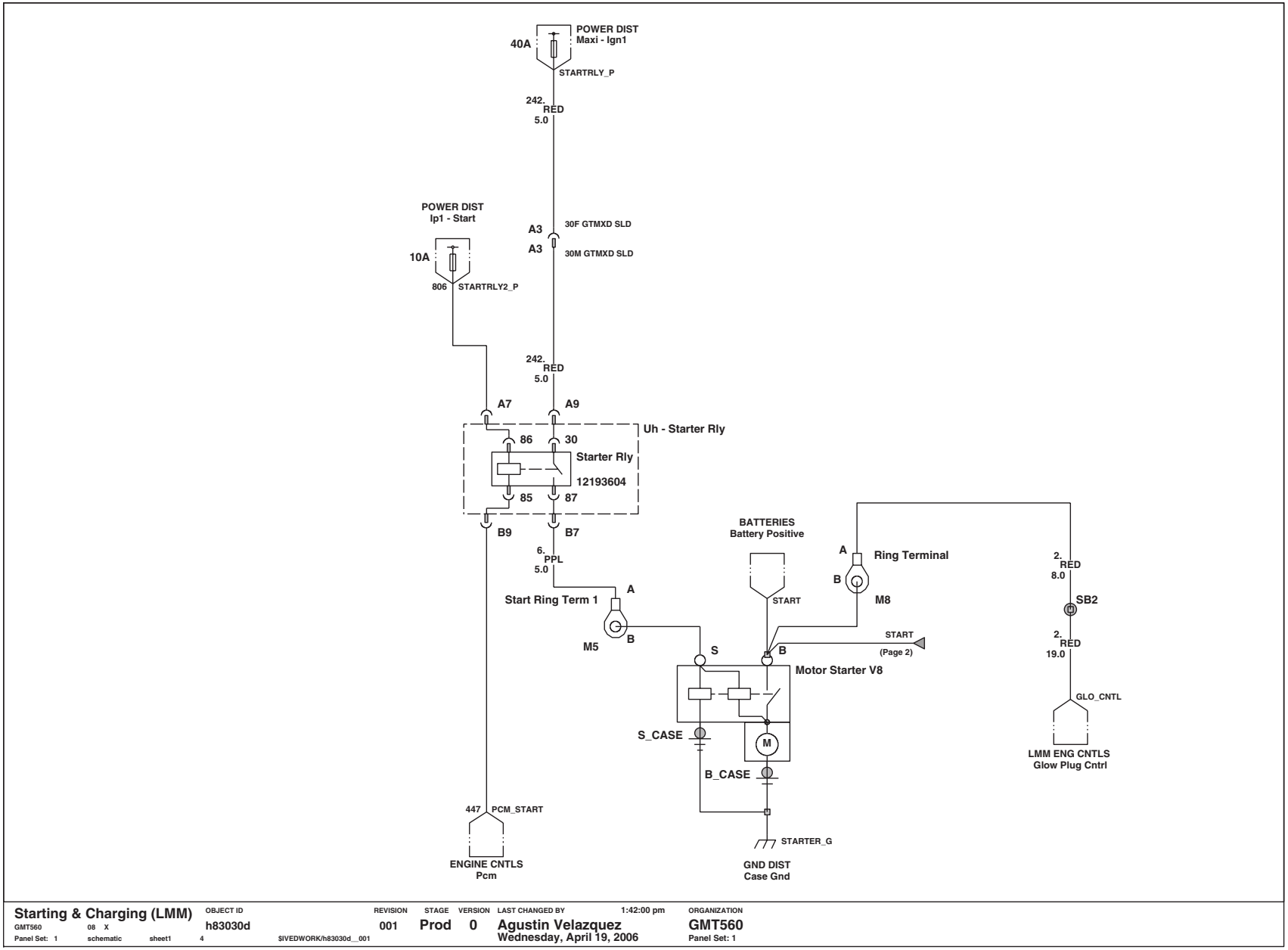
Optional Generators:

Family 3: 15744911 - K68; 105 amps
TBD - KG4; 150 amps

Family 2: 10480382 - K65; 95 amps
15744912 - K68; 105 amps
TBD - KG4; 150 amps

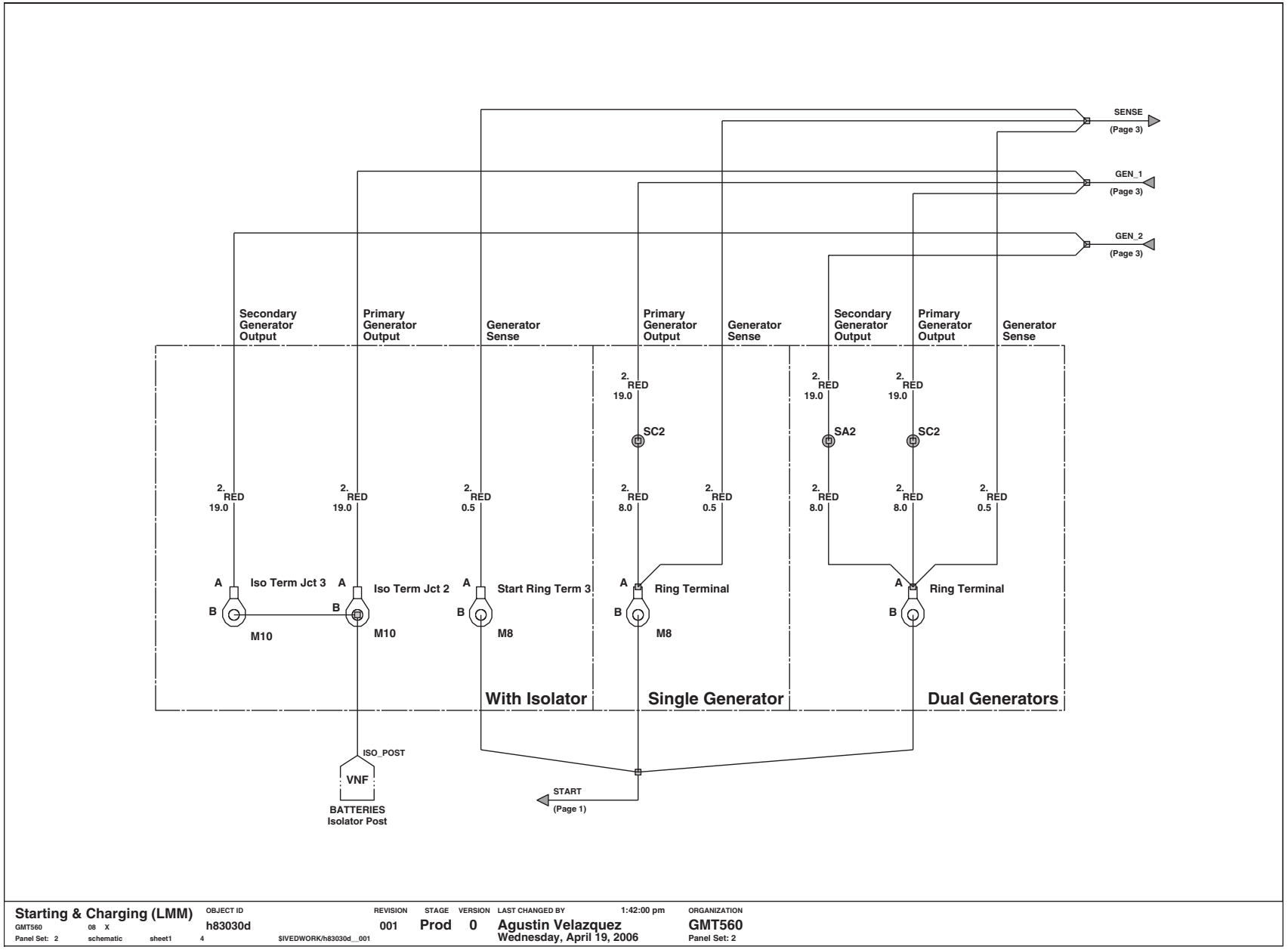
Starting & Charging (L18)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83030a	001	Beta	0	Agustin Velazquez	1:37:34 pm	GMT560
Panel Set: 3 schematic sheet1 19	$IVEDWORK/h83030a__001				Wednesday, April 19, 2006		Panel Set: 3

Starting & Charging (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel



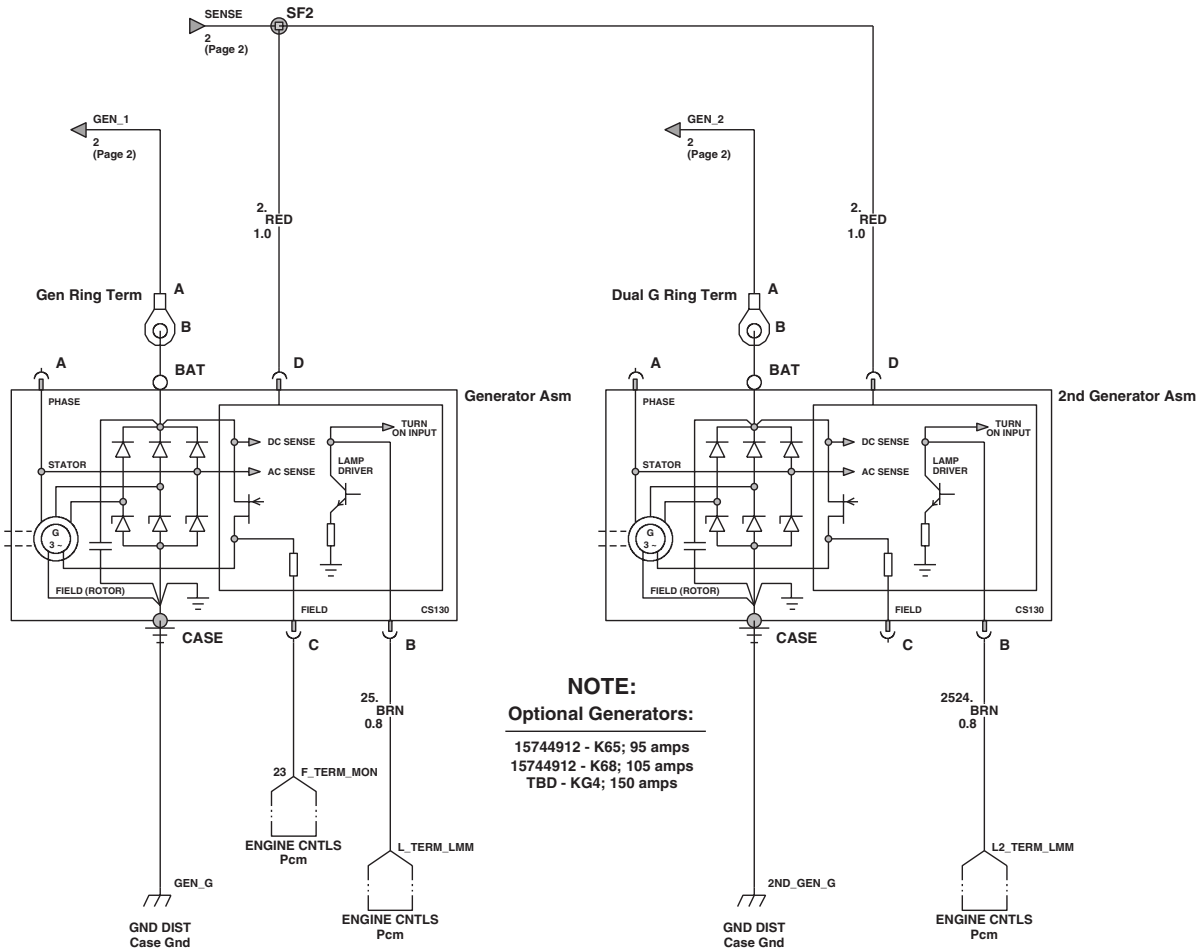
Starting & Charging (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83030d	001	Prod	0	Agustin Velazquez	1:42:00 pm	GMT560
Panel Set: 1 schematic sheet1 4	$IVEDWORK/h83030d__001				Wednesday, April 19, 2006		Panel Set: 1

Starting & Charging (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



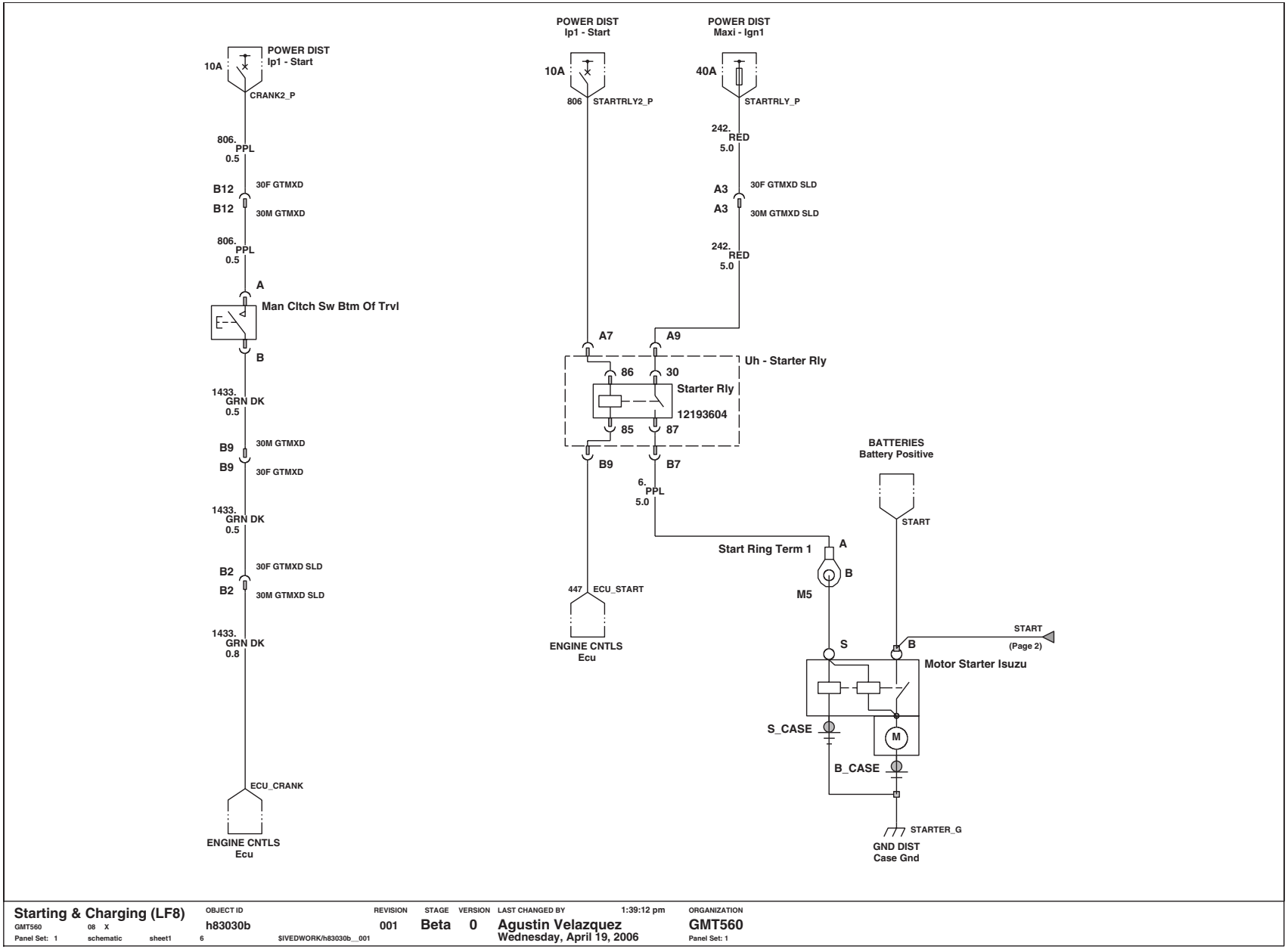
Starting & Charging (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:42:00 pm	ORGANIZATION
GMT560 08 X	h83030d	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 2 schematic sheet1 4	$IVEDWORK/h83030d__001				Wednesday, April 19, 2006		Panel Set: 2

Starting & Charging (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



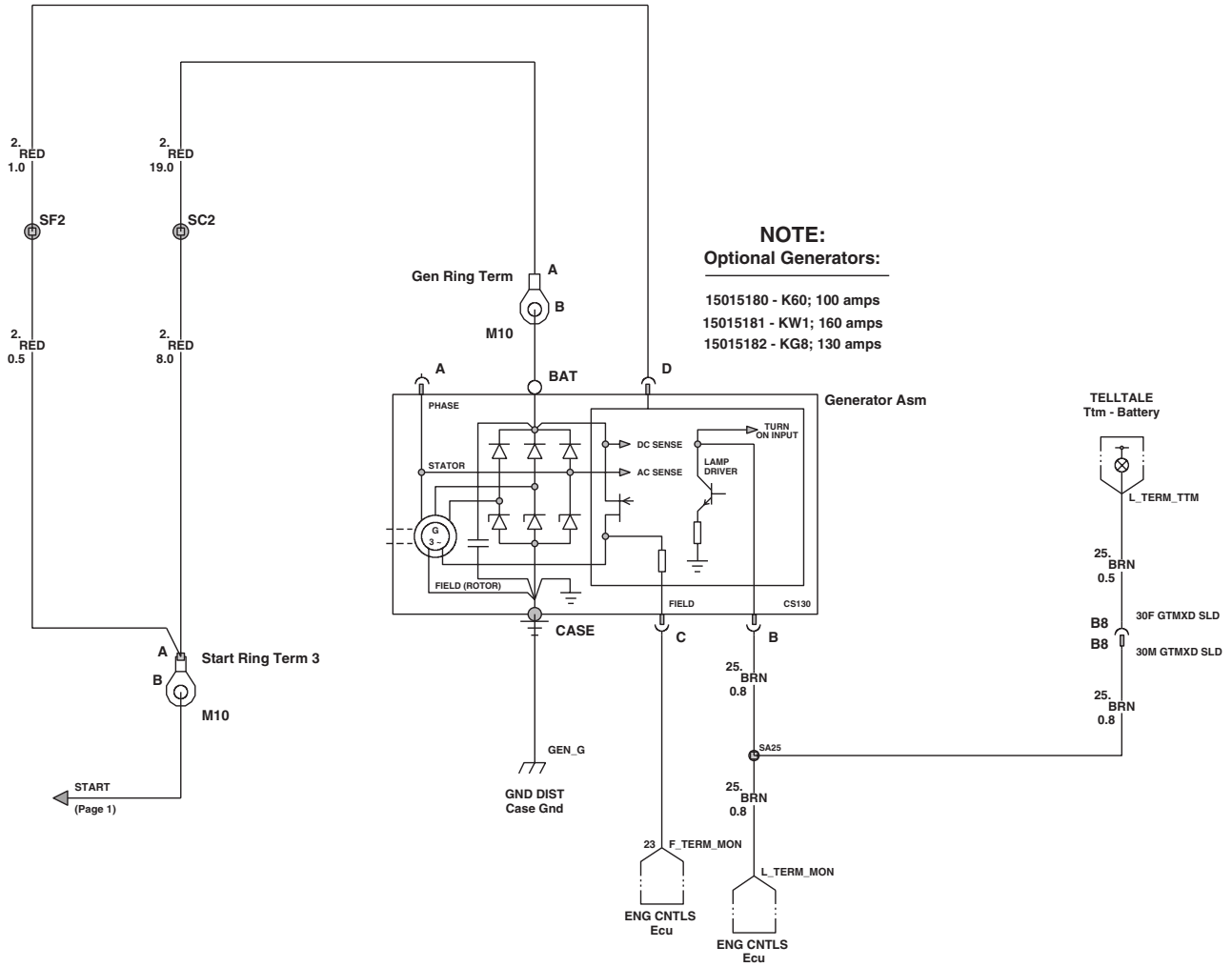
Starting & Charging (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:42:00 pm	ORGANIZATION
GMT560 08 X	h83030d	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 3 schematic sheet1 4	$IVEDWORK/h83030d__001				Wednesday, April 19, 2006		Panel Set: 3

Starting & Charging (LF8) 7.8L L6 Isuzu 6H - Diesel



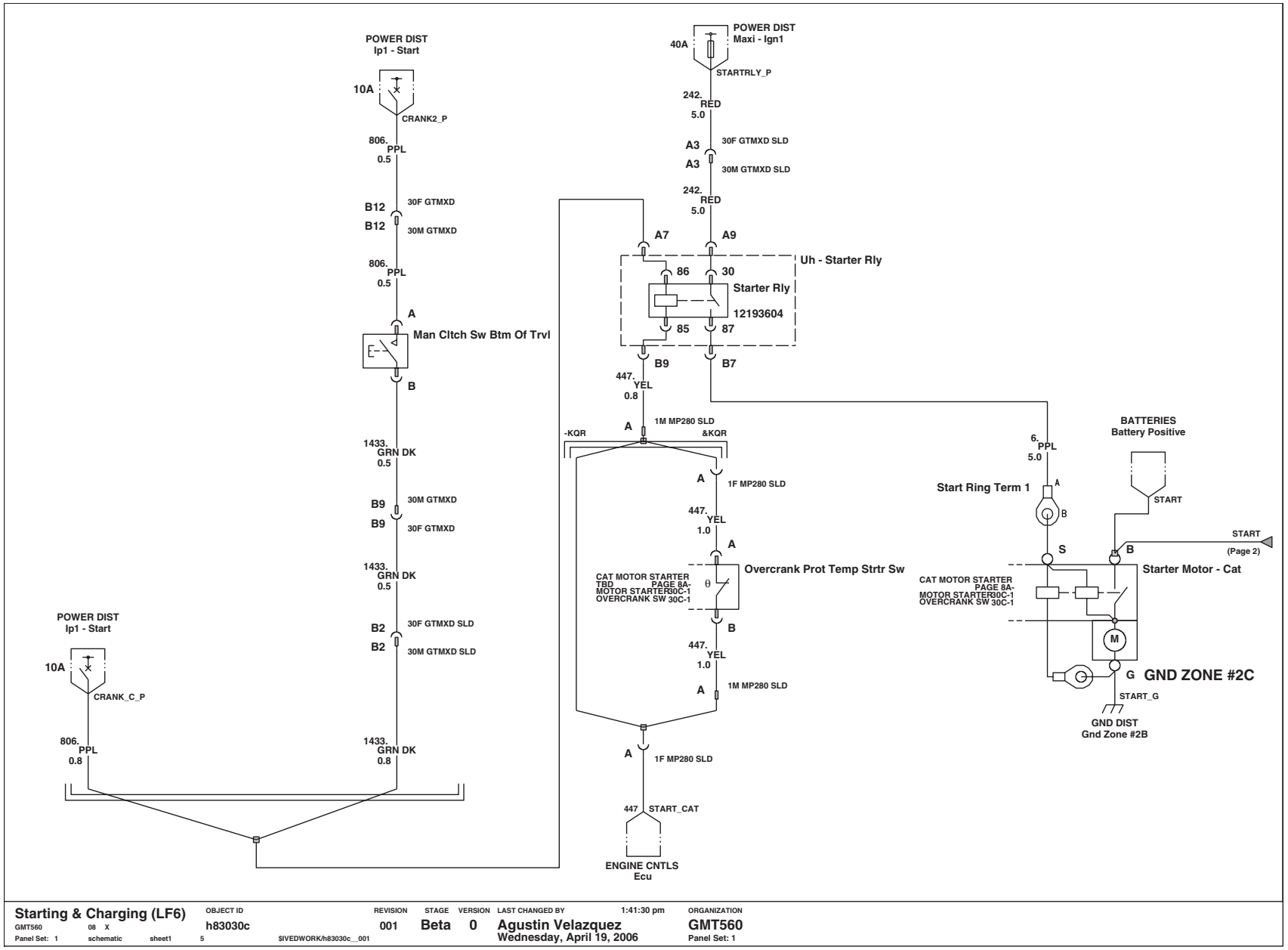
Starting & Charging (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83030b	001	Beta	0	Agustin Velazquez	1:39:12 pm	GMT560
Panel Set: 1 schematic sheet1 6	$IVEDWORK/h83030b__001				Wednesday, April 19, 2006		Panel Set: 1

Starting & Charging (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



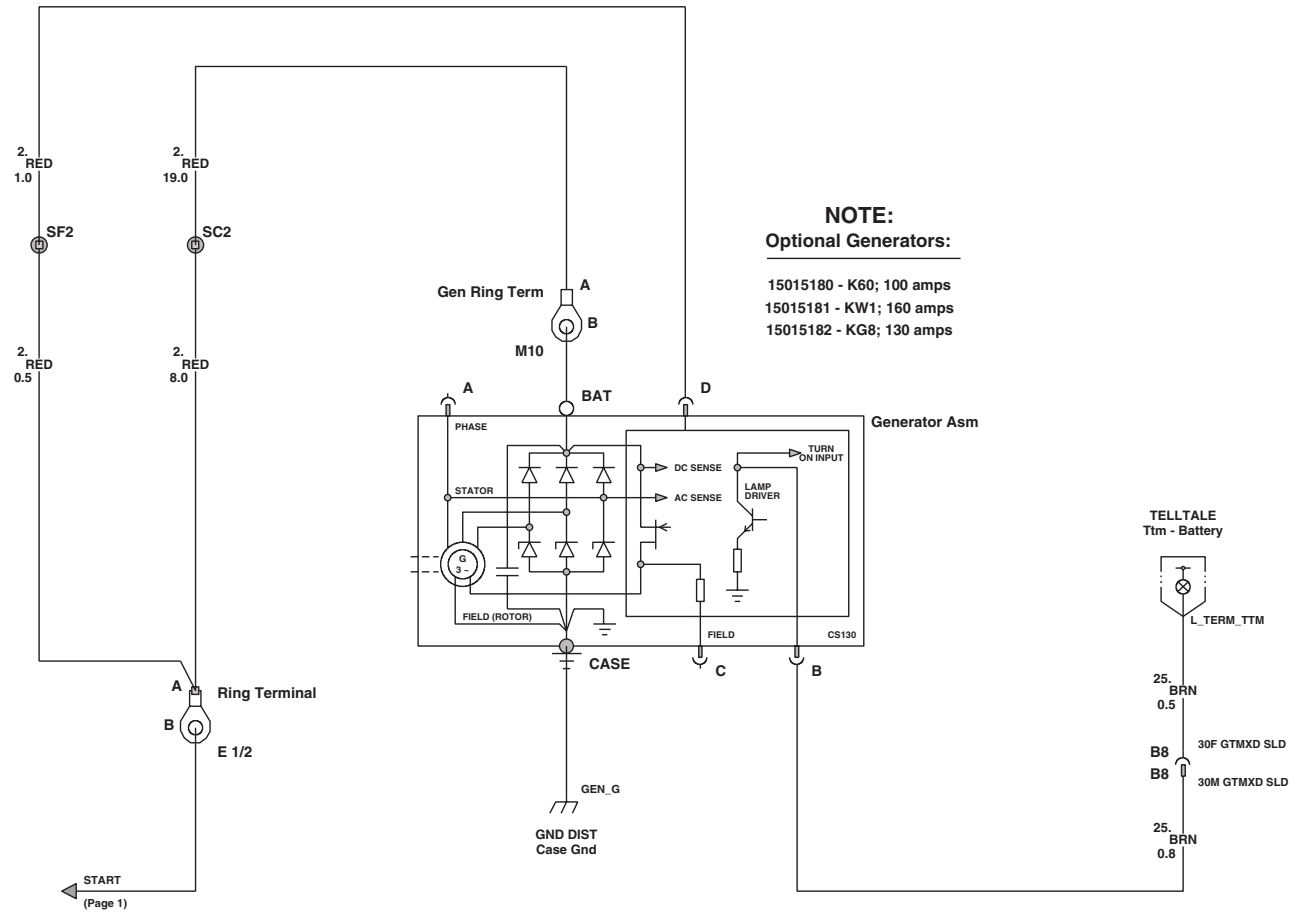
Starting & Charging (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83030b	001	Beta	0	Agustin Velazquez	1:39:12 pm	GMT560
Panel Set: 2 schematic sheet1 6	$IVEDWORK/h83030b__001				Wednesday, April 19, 2006		Panel Set: 2

Starting & Charging (LF6) 7.2L L6 Caterpillar® C7 - Diesel



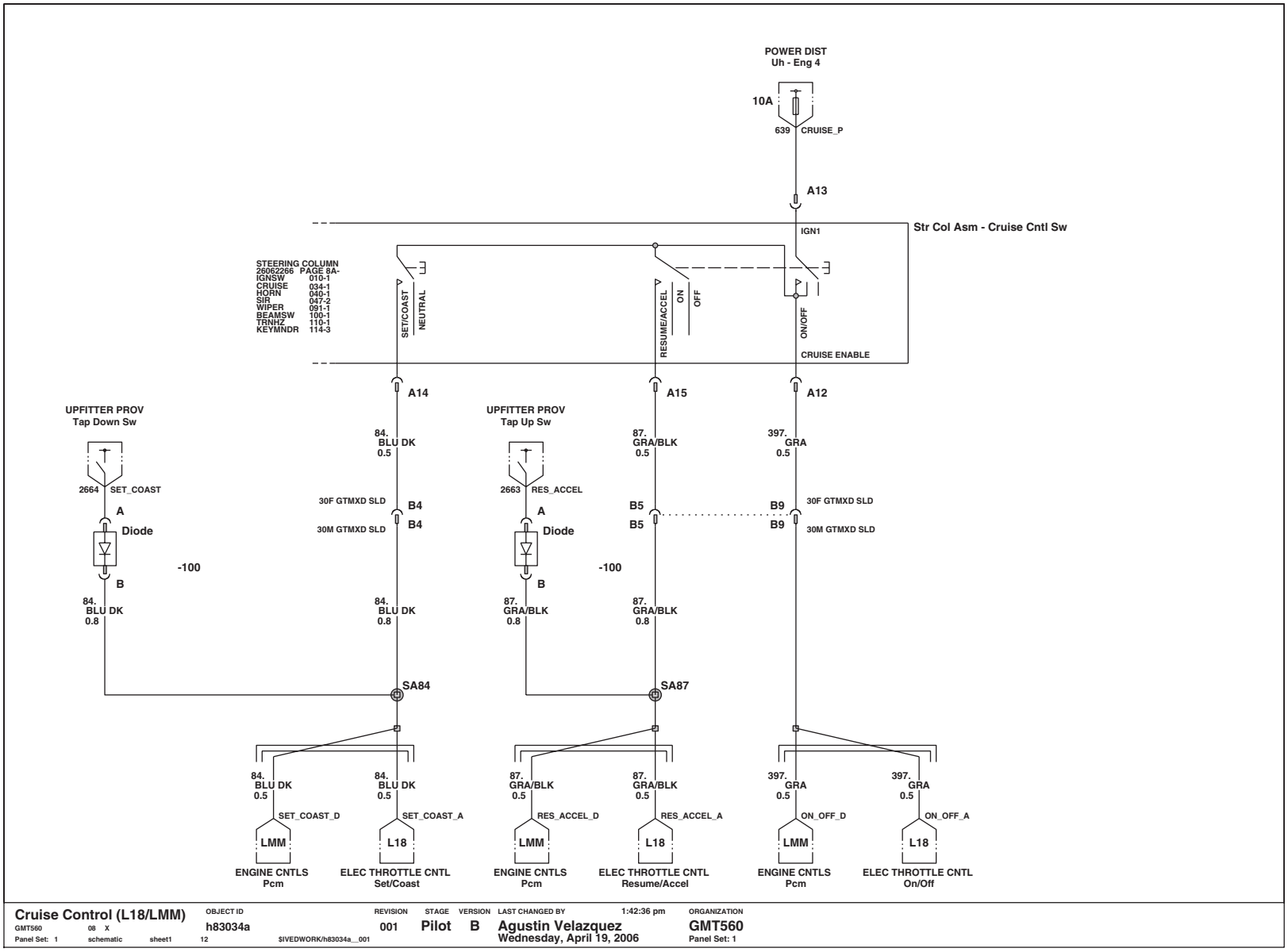
Starting & Charging (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83030c	001	Beta	0	Agustin Velazquez	1:41:30 pm	GMT560
Panel Set: 1 schematic sheet1 5	$IVEDWORK/h83030c__001				Wednesday, April 19, 2006		Panel Set: 1

Starting & Charging (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



Starting & Charging (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:41:30 pm	ORGANIZATION
GMT560 08 X	h83030c	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 2 schematic sheet1 5	$IVEDWORK/h83030c__001				Wednesday, April 19, 2006		Panel Set: 2

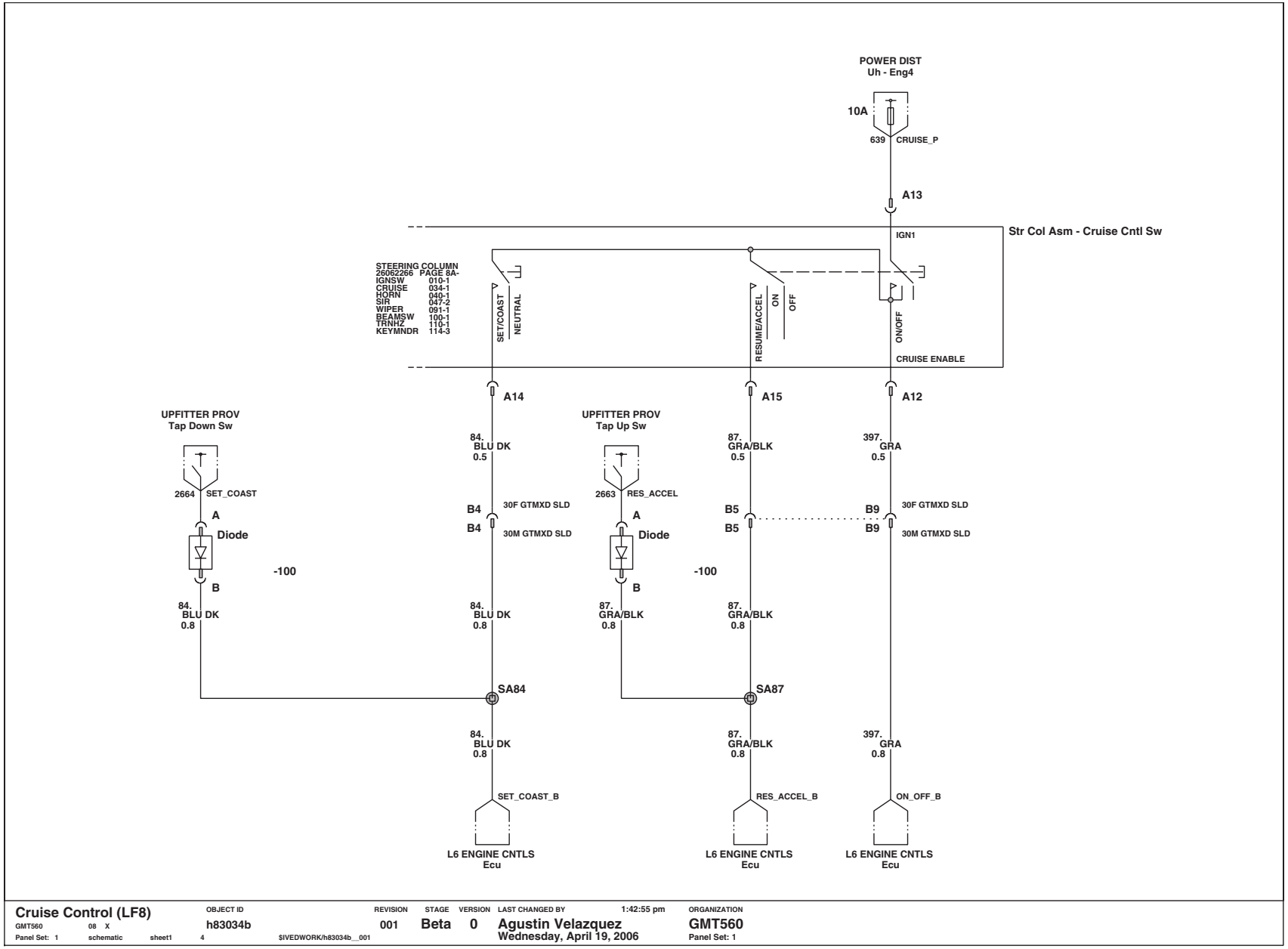
Cruise Control (L18) 8.1L V8 GMPT VORTEC® - Gas – (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel



Cruise Control (L18/LMM) OBJECT ID h83034a REVISION 001 STAGE Pilot VERSION B LAST CHANGED BY Agustin Velazquez 1:42:36 pm Wednesday, April 19, 2006 ORGANIZATION GMT560 Panel Set: 1

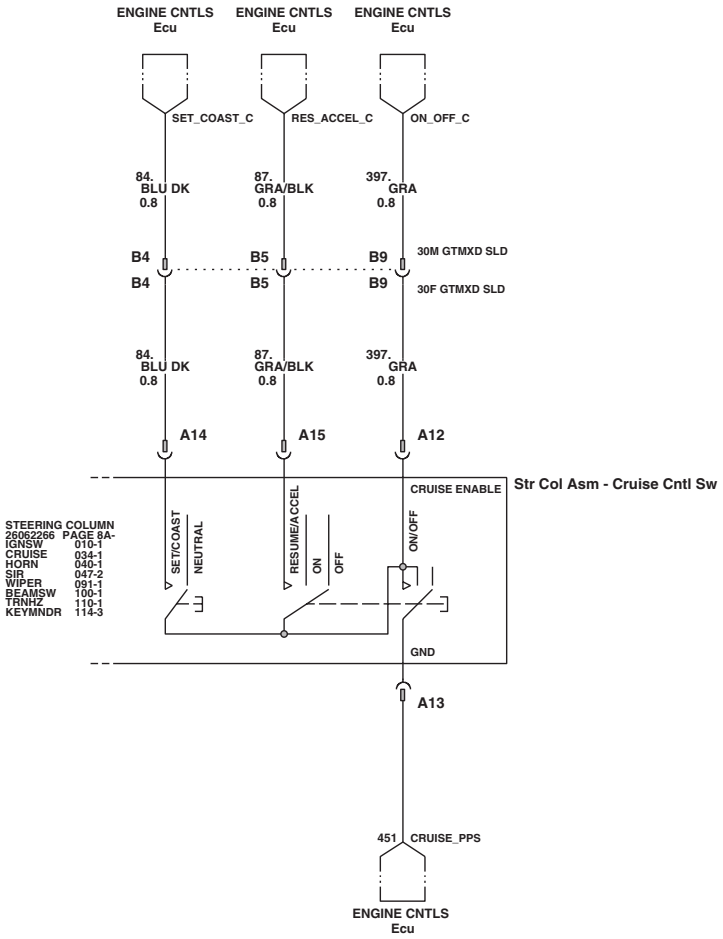
GMT560 08 X Panel Set: 1 schematic sheet1 12 $IVEDWORK/h83034a__001

Cruise Control (LF8) 7.8L L6 Isuzu 6H - Diesel



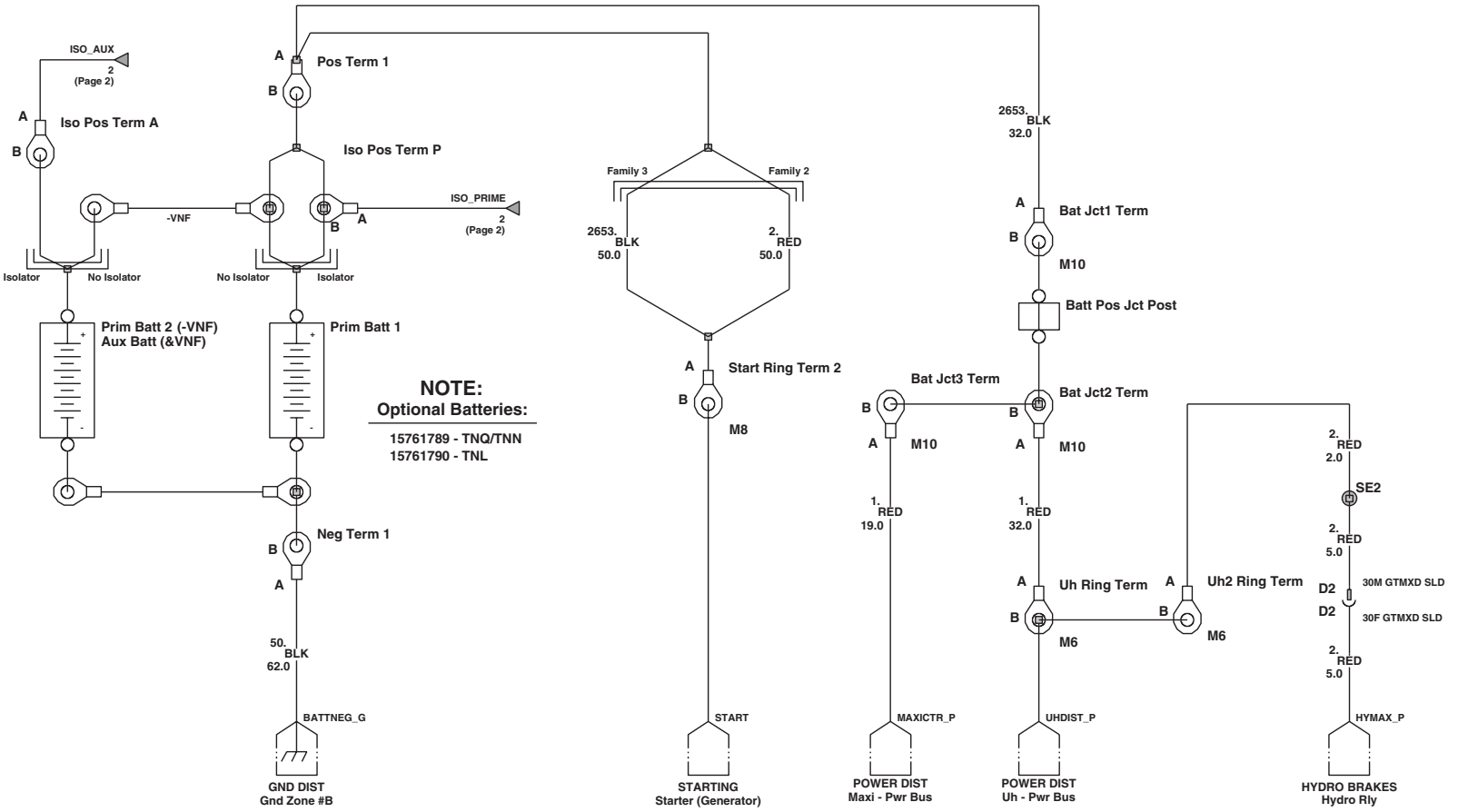
Cruise Control (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83034b	001	Beta	0	Agustin Velazquez	1:42:55 pm	GMT560
Panel Set: 1 schematic sheet1 4 $IVEDWORK/h83034b__001					Wednesday, April 19, 2006		Panel Set: 1

Cruise Control (LF6) 7.2L L6 Caterpillar® C7 - Diesel



Cruise Control (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:43:17 pm	ORGANIZATION
GMT560 08 X	h83034c	001	Pilot	0	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 4	$IVEDWORK/h83034c__001				Wednesday, April 19, 2006		Panel Set: 1

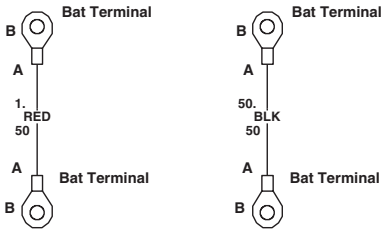
Batteries - Top Post (L18) 8.1L V8 GMPT VORTEC® - Gas



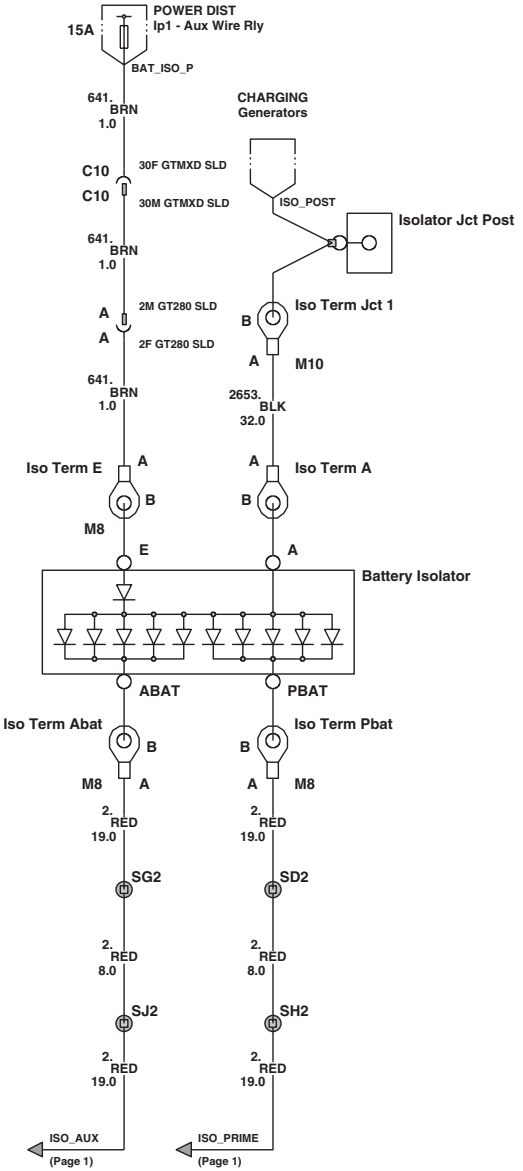
See Page 2 for Bat to Bat cable properties

Batteries (L18 Top Post)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:43:36 pm	ORGANIZATION
GMT560 08 X	h83035a	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83035a__001				Wednesday, April 19, 2006		Panel Set: 1

Batteries - Top Post (L18) 8.1L V8 GMPT VORTEC® - Gas (continued)



Bat to Bat cable properties



Batteries (L18 Top Post)
GMT560 08 X
Panel Set: 2 schematic sheet1 3

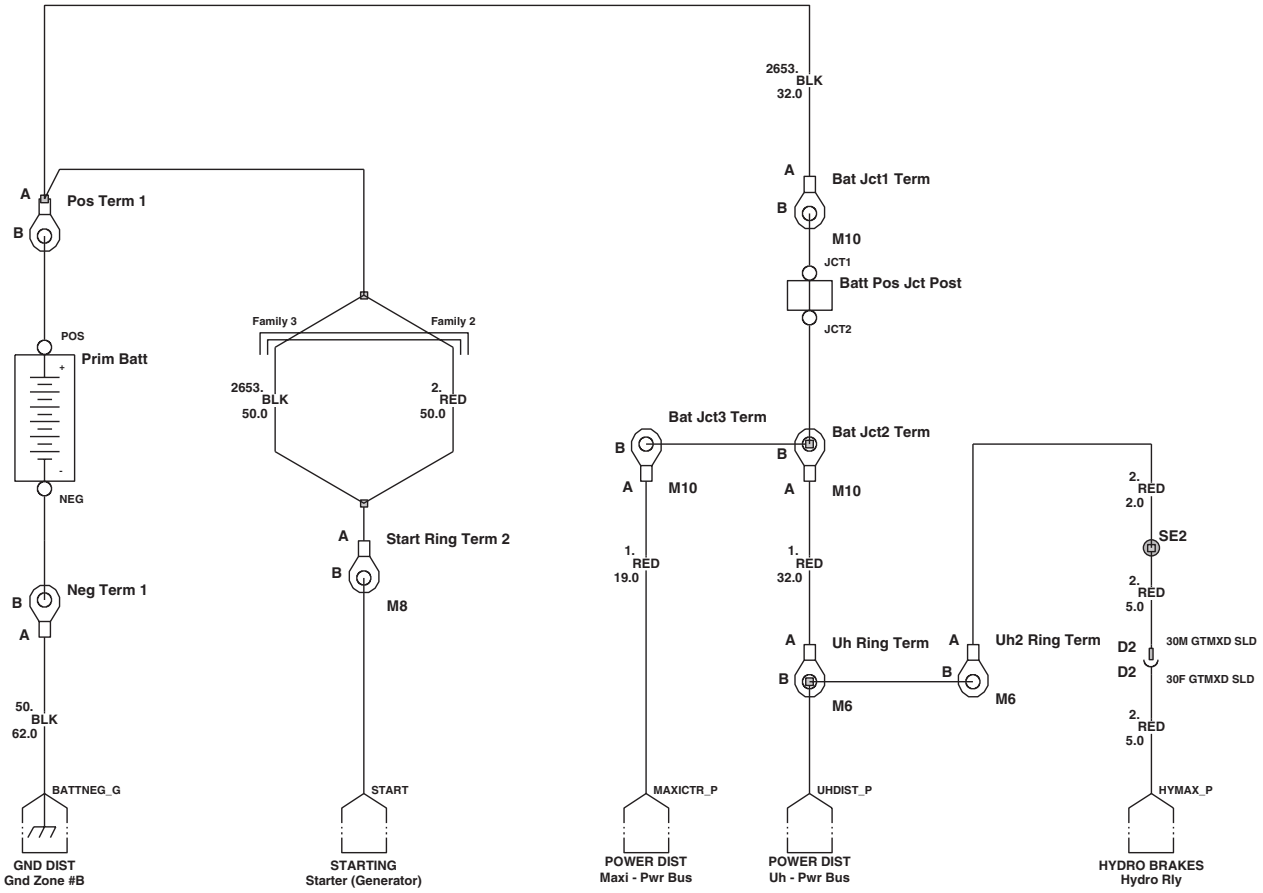
OBJECT ID: h83035a
$IVEDWORK/h83035a__001

REVISION: 001
STAGE: Prod
VERSION: 0
LAST CHANGED BY: Agustin Velazquez
1:43:36 pm Wednesday, April 19, 2006
ORGANIZATION: GMT560
Panel Set: 2

Batteries - Side Post (L18) 8.1L V8 GMPT VORTEC® - Gas

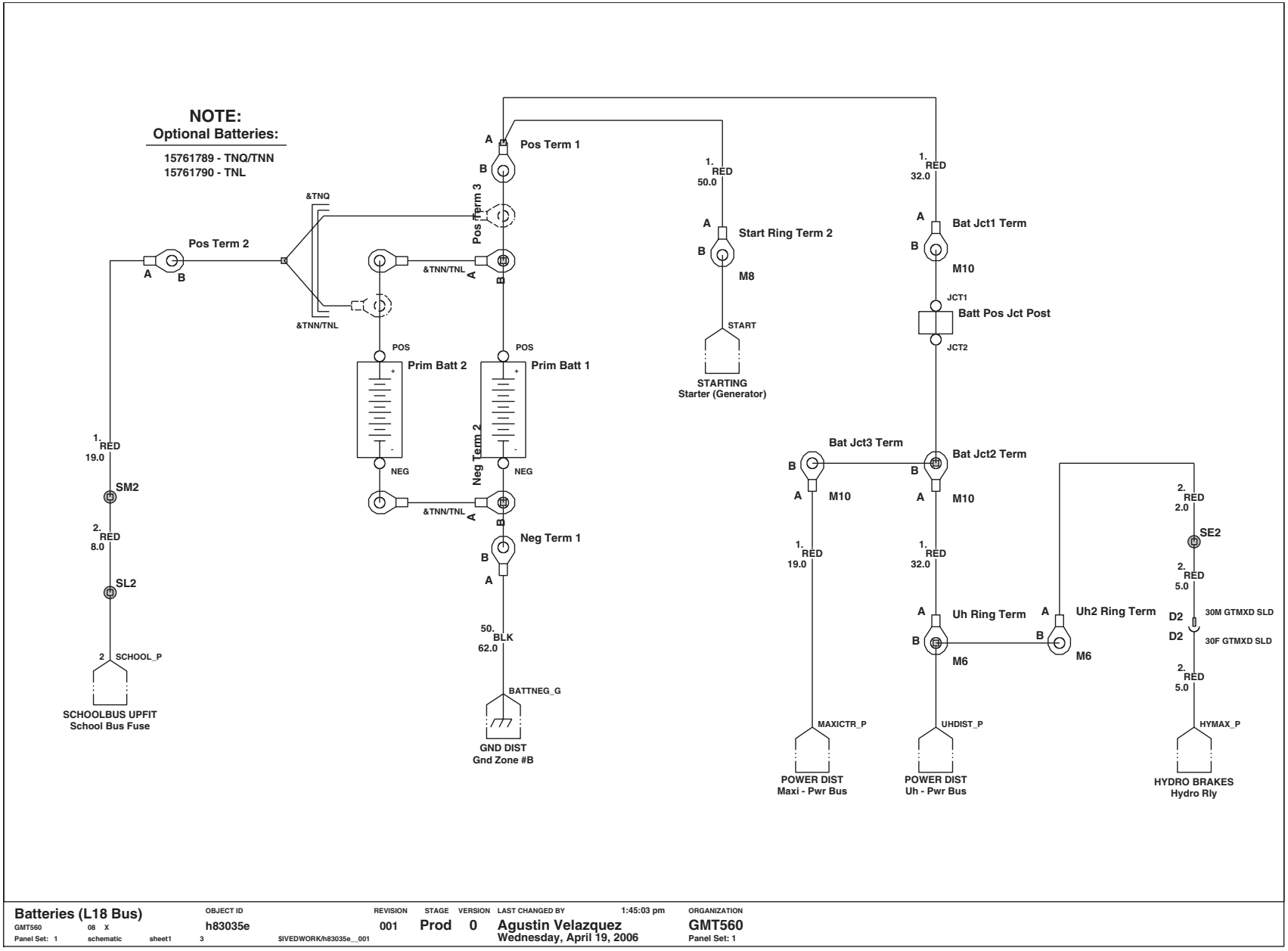
NOTE:
Optional Batteries:

19001810 - TM1
19001814 - TM2



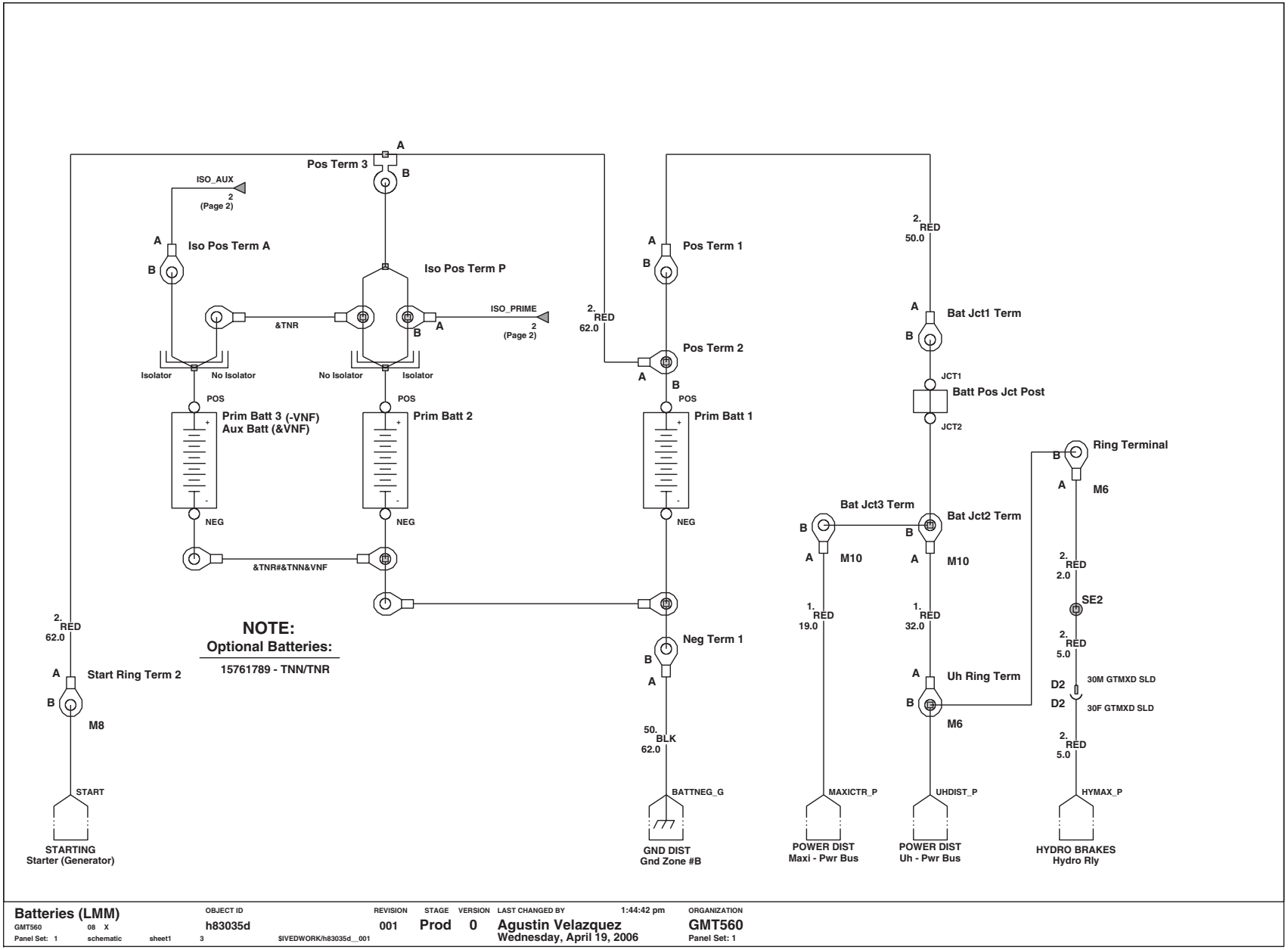
Batteries (L18 Side Post)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83035g	001	Prod	0	Agustin Velazquez	1:45:43 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83035g__001				Wednesday, April 19, 2006		Panel Set: 1

Batteries – Bus (L18) 8.1L V8 GMPT VORTEC® - Gas



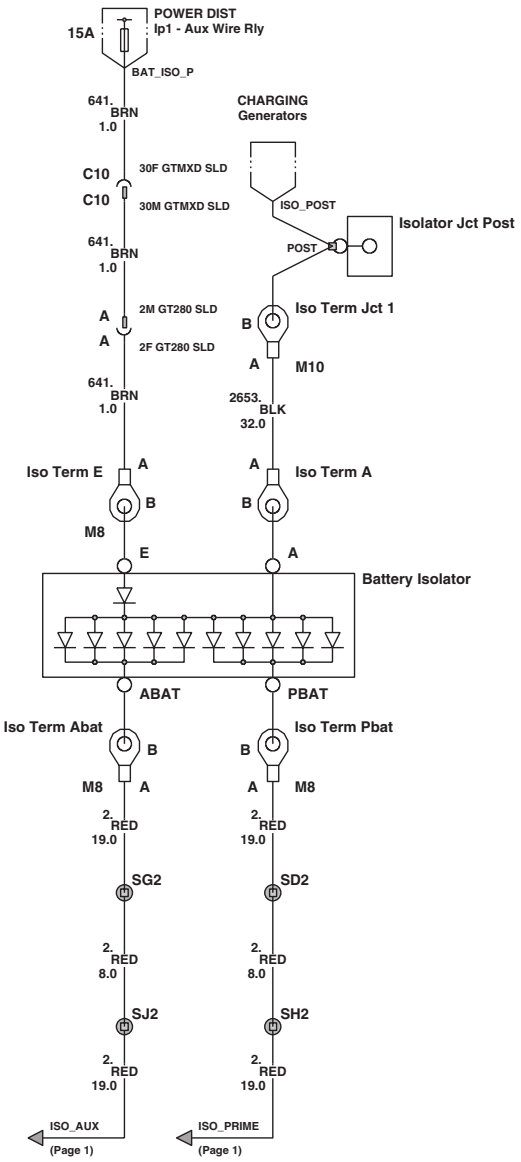
Batteries (L18 Bus)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83035e	001	Prod	0	Agustin Velazquez	1:45:03 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83035e__001				Wednesday, April 19, 2006		Panel Set: 1

Batteries (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel



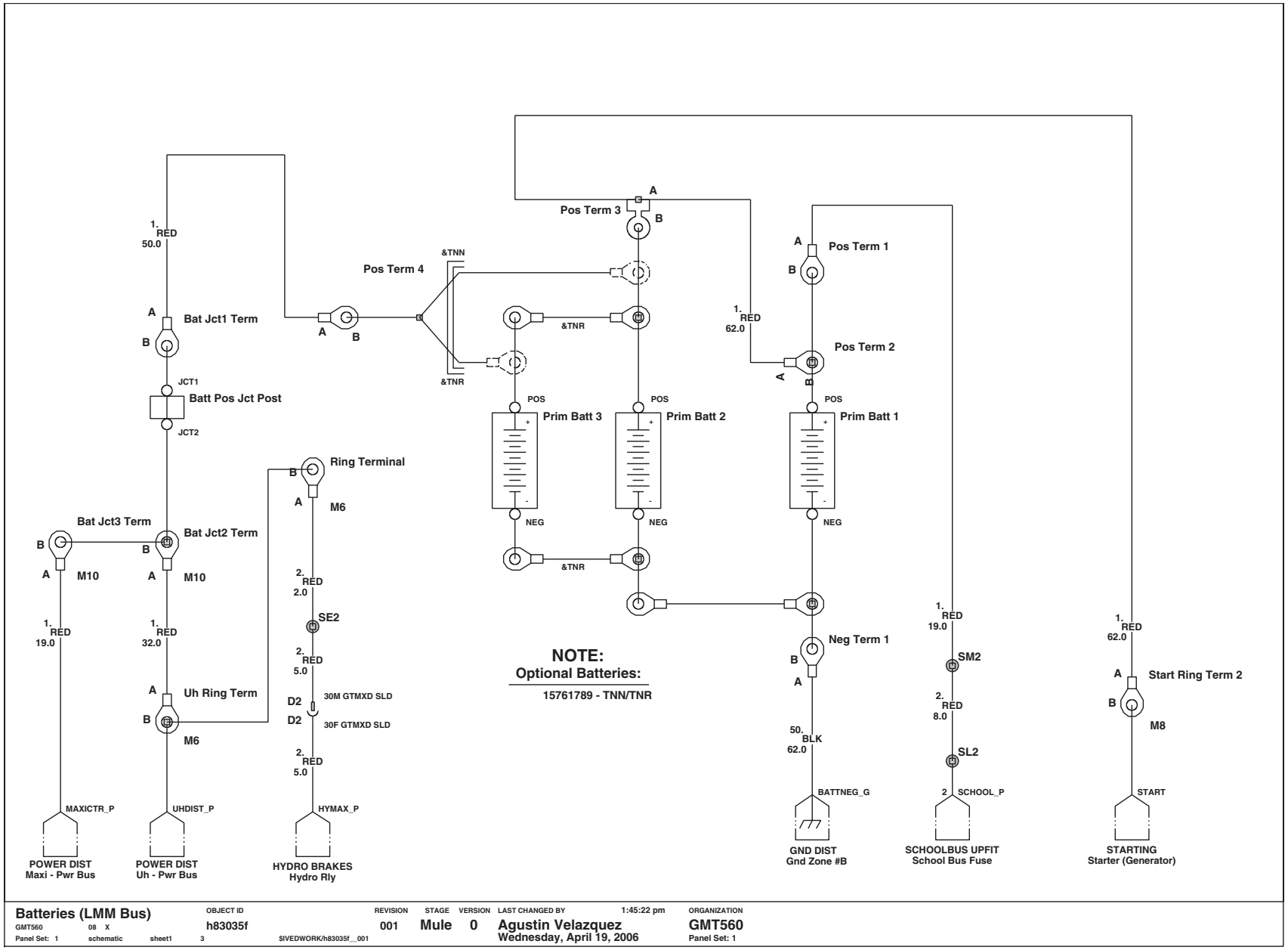
Batteries (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83035d	001	Prod	0	Agustin Velazquez	1:44:42 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83035d__001				Wednesday, April 19, 2006		Panel Set: 1

Batteries (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)



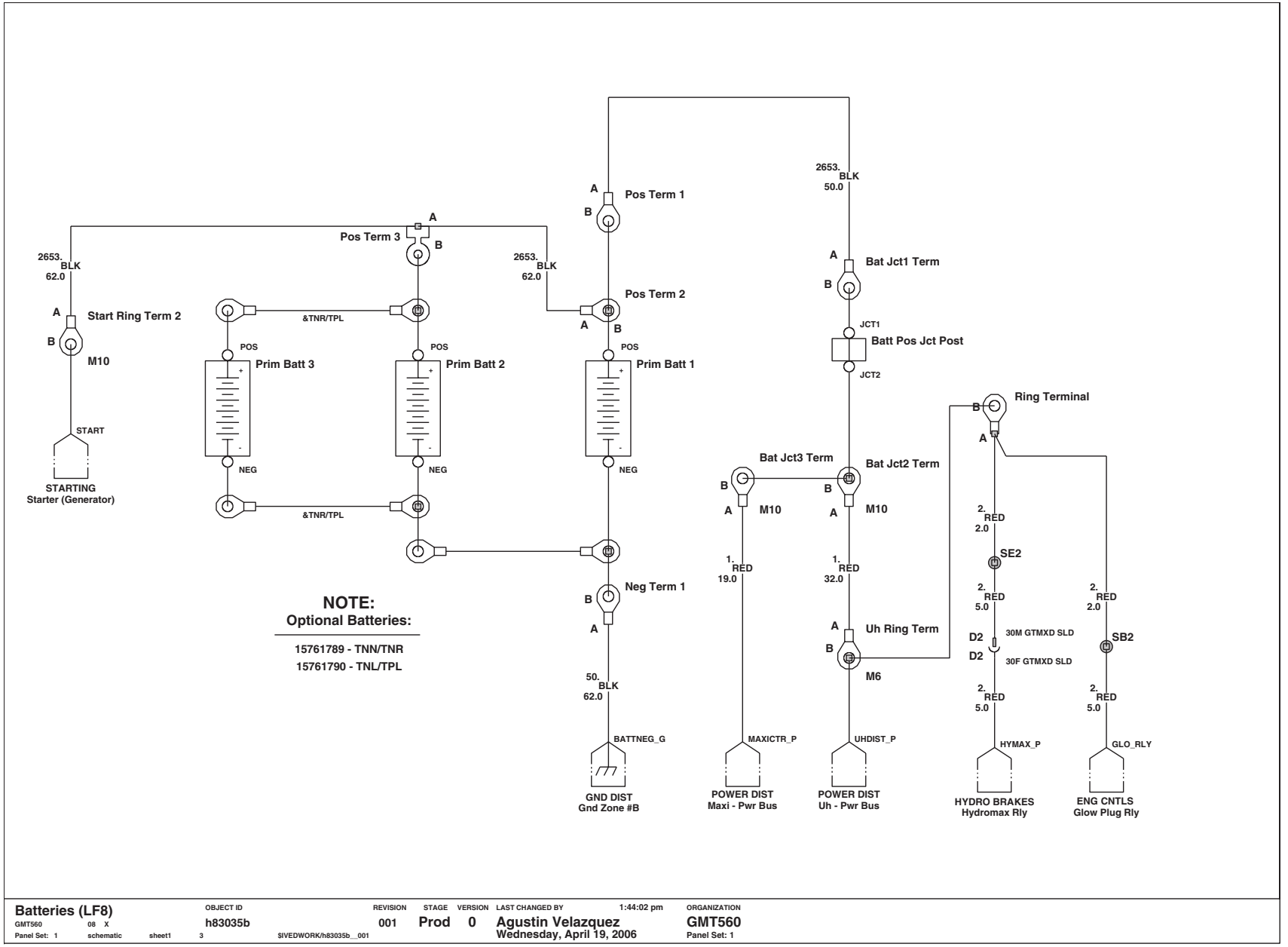
Batteries (LMM)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83035d	001	X	0	Agustin Velazquez	1:44:42 pm	GMT560
Panel Set: 2 schematic sheet1 3	$IVEDWORK/h83035d__001				Wednesday, April 19, 2006		Panel Set: 2

Batteries - Bus (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel



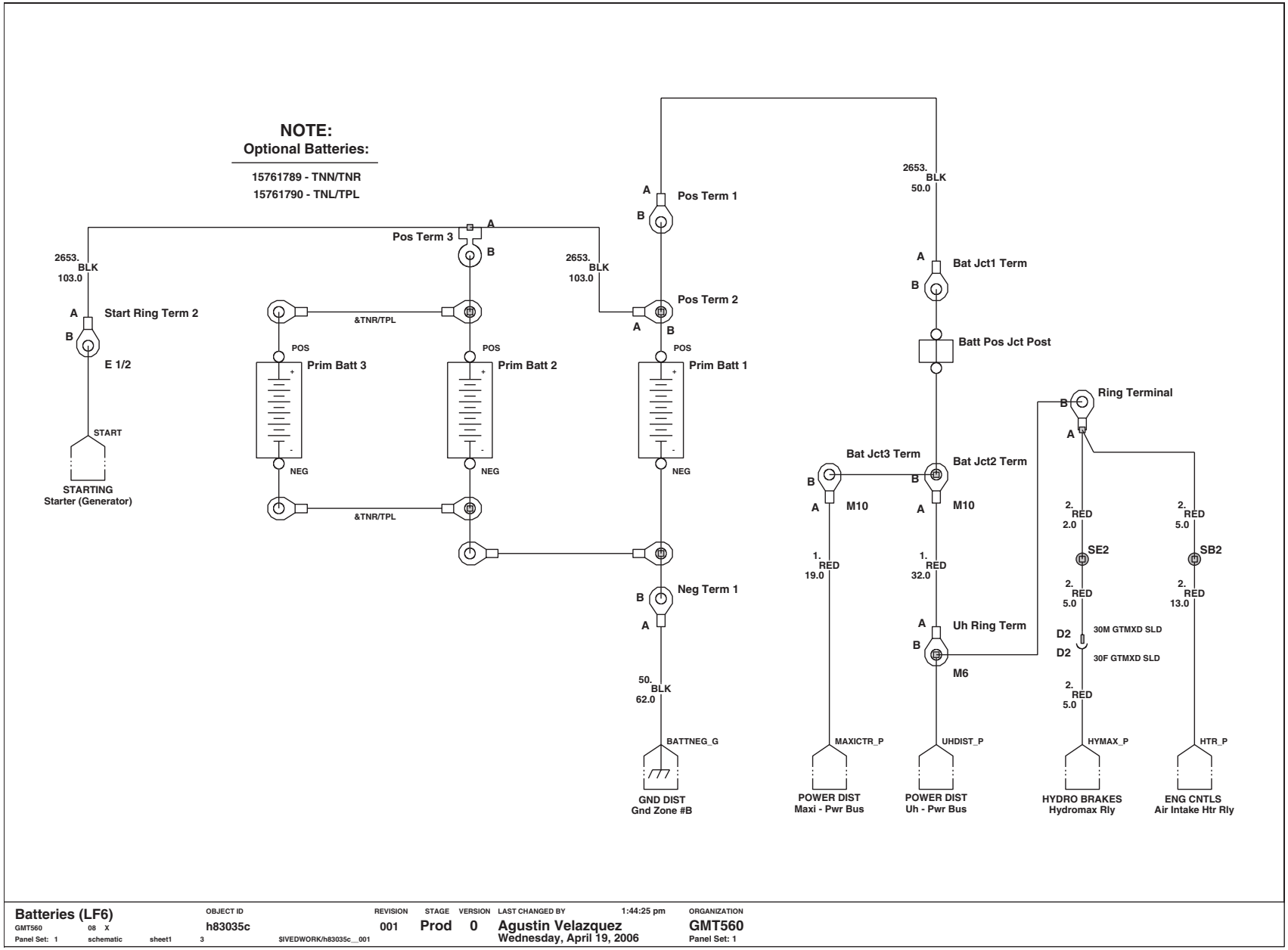
Batteries (LMM Bus)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83035f	001	Mule	0	Agustin Velazquez	1:45:22 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83035f__001				Wednesday, April 19, 2006		Panel Set: 1

Batteries (LF8) 7.8L L6 Isuzu 6H - Diesel



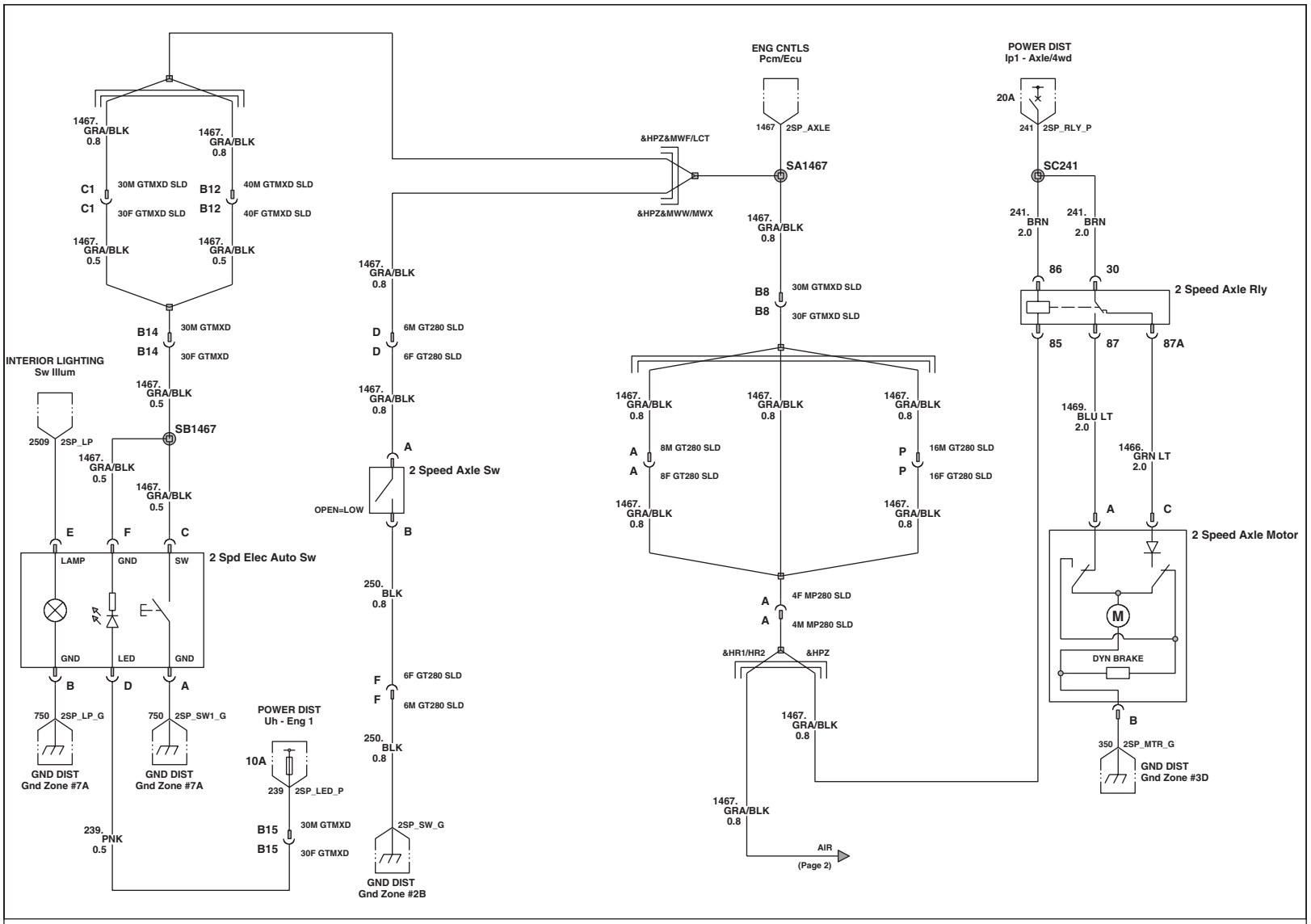
Batteries (LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83035b	001	Prod	0	Agustin Velazquez	1:44:02 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83035b__001				Wednesday, April 19, 2006		Panel Set: 1

Batteries (LF6) 7.2L L6 Caterpillar® C7 - Diesel

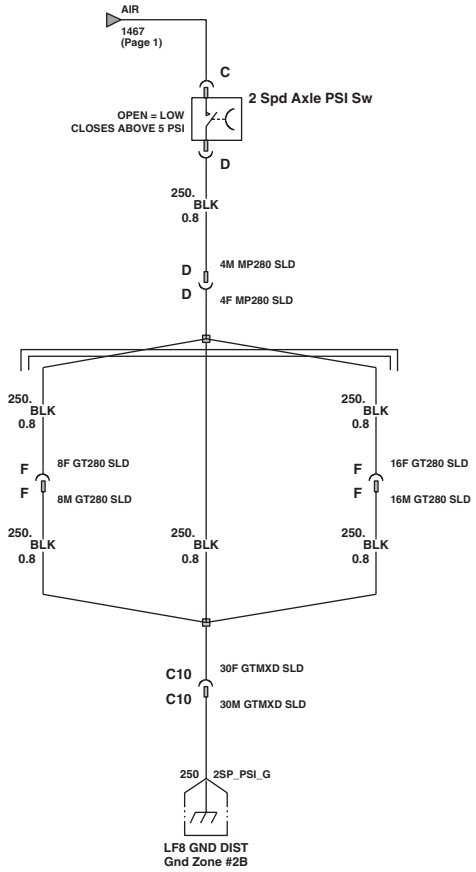


Batteries (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:44:25 pm	ORGANIZATION
GMT560 08 X	h83035c	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83035c__001				Wednesday, April 19, 2006		Panel Set: 1

2-Speed Rear Axle (L18) 8.1L V8 GMPT VORTEC® - Gas – (LF8) 7.8L L6 Isuzu 6H - Diesel

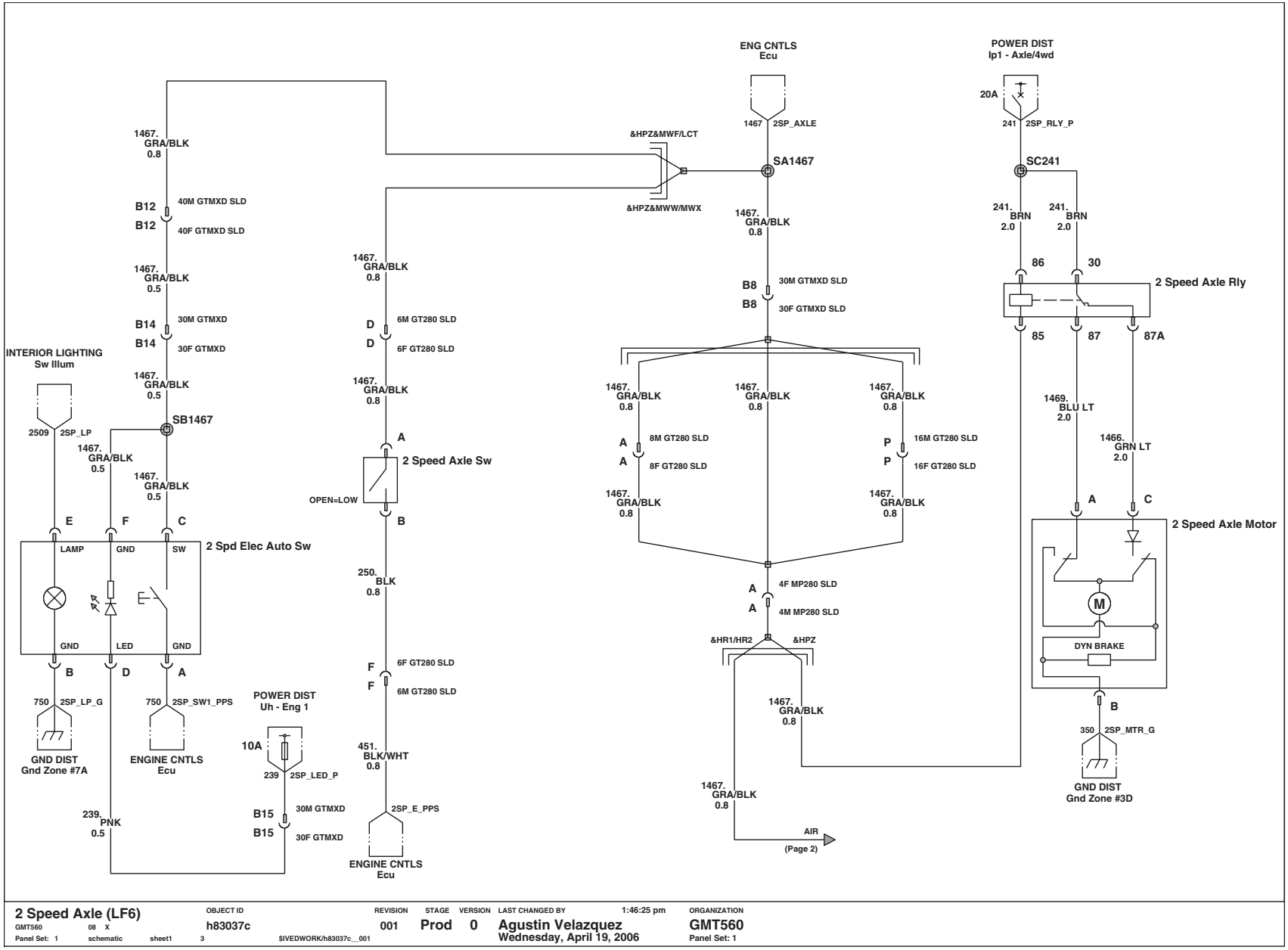


2-Speed Rear Axle (L18) 8.1L V8 GMPT VORTEC® - Gas – (LF8) 7.8L L6 Isuzu 6H - Diesel (continued)



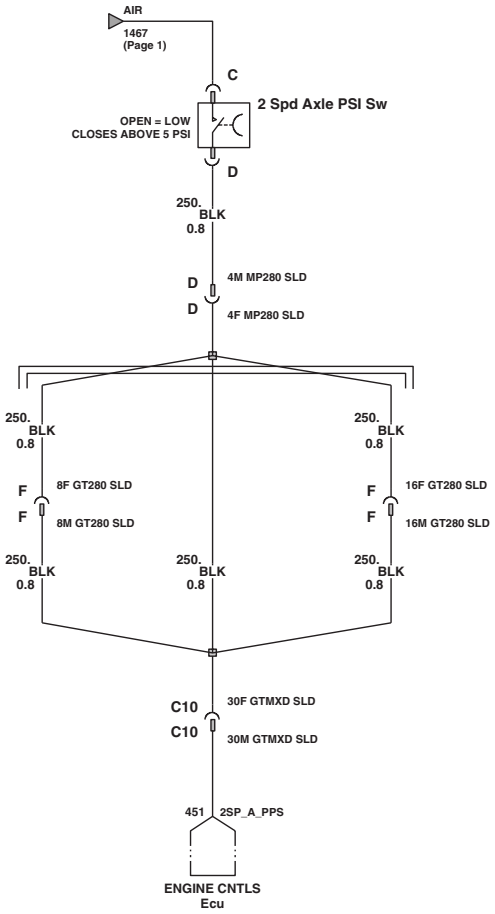
2 Speed Axle (L18/LF8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:46:06 pm	ORGANIZATION
GMT560 08 X	h83037a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 2 schematic sheet1 8	SIVEDWORK/h83037a__001				Wednesday, April 19, 2006		Panel Set: 2

2-Speed Axle (LF6) 7.2L L6 Caterpillar® C7 - Diesel



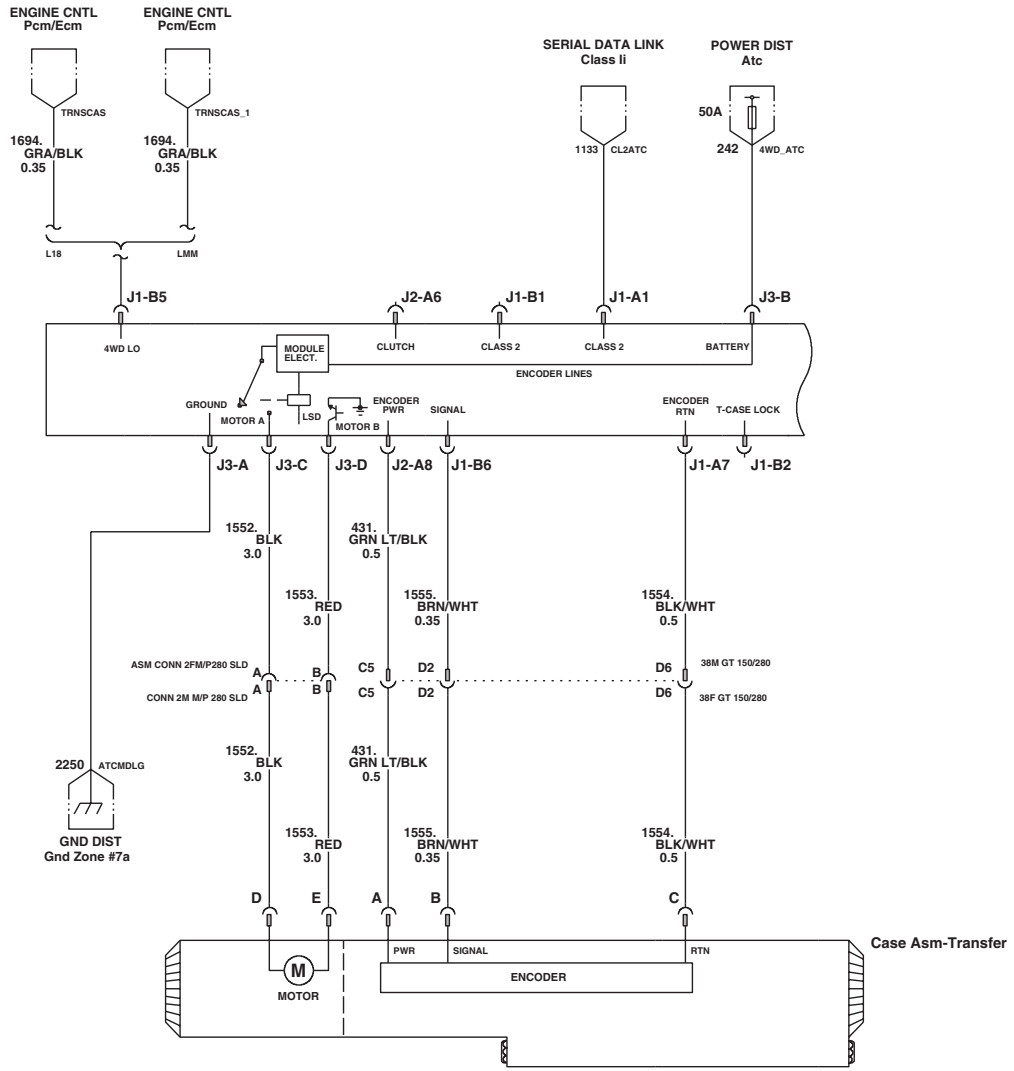
2 Speed Axle (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83037c	001	Prod	0	Agustin Velazquez	1:46:25 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83037c__001				Wednesday, April 19, 2006		Panel Set: 1

2-Speed Axle (LF6) 7.2L L6 Caterpillar® C7 - Diesel



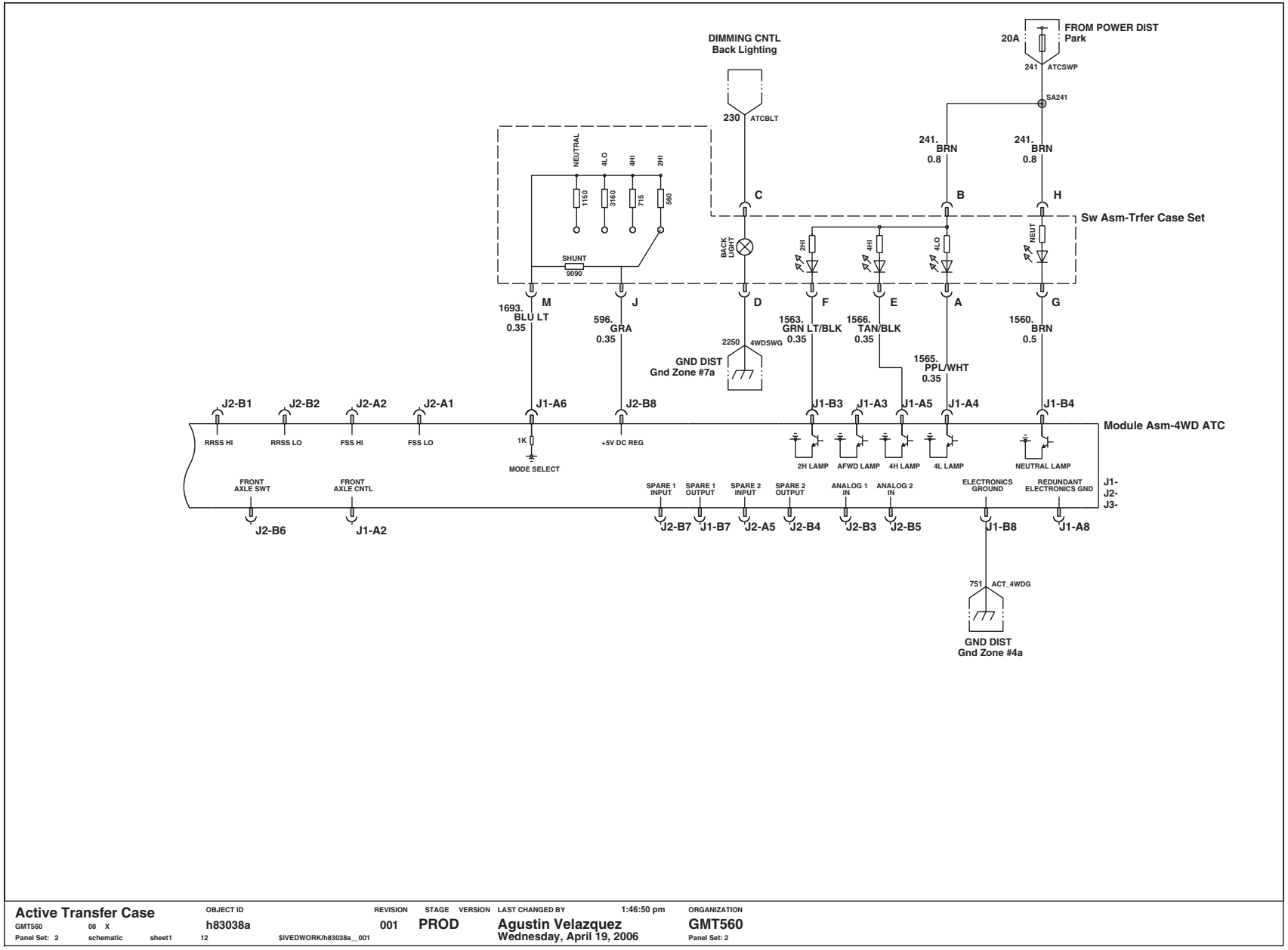
2 Speed Axle (LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83037c	001	Prod	0	Agustin Velazquez	1:46:25 pm	GMT560
Panel Set: 2 schematic sheet1 3 $IVEDWORK/h83037c__001					Wednesday, April 19, 2006		Panel Set: 2

Active Transfer Case



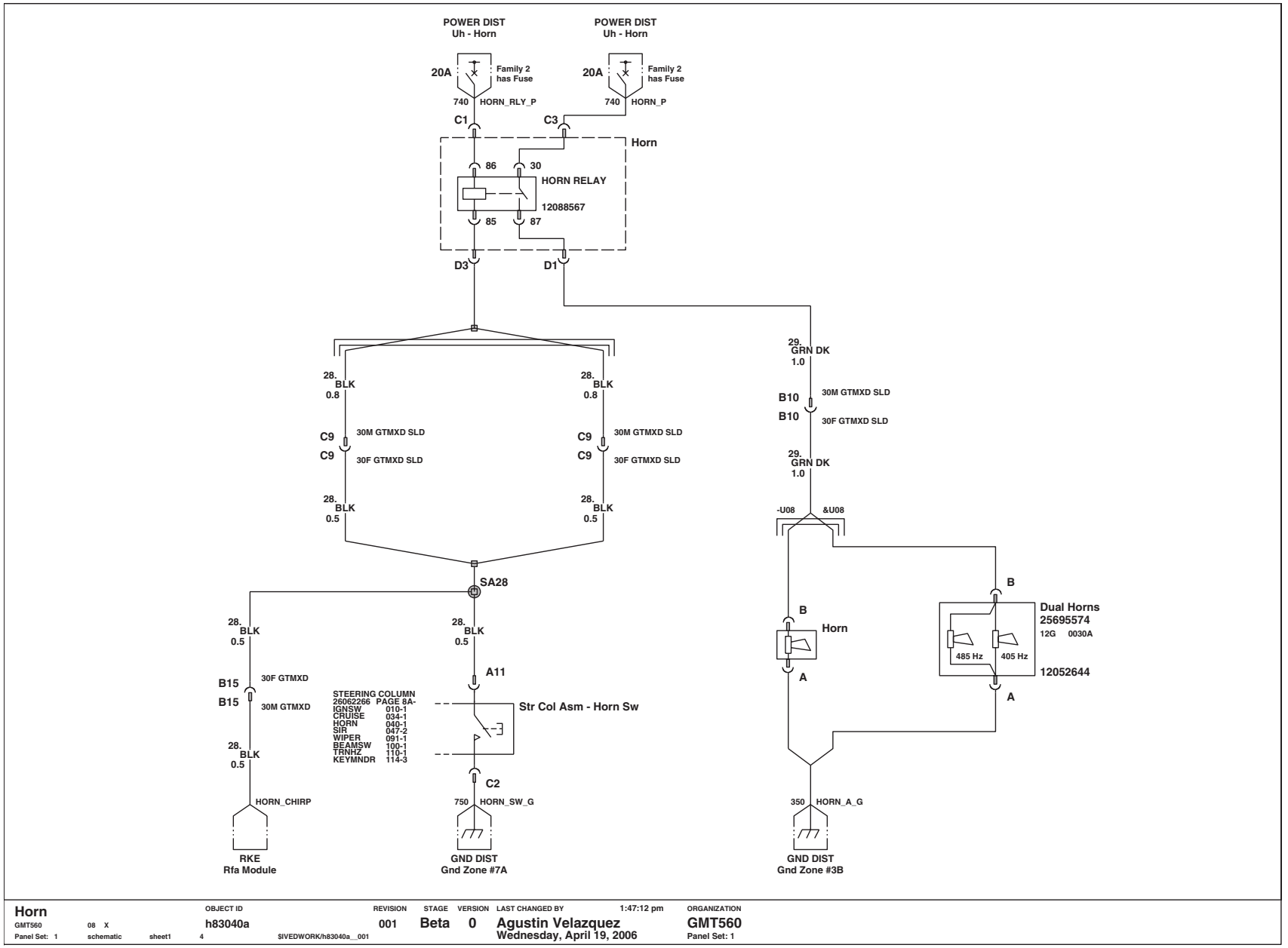
Active Transfer Case	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:46:50 pm	ORGANIZATION	
GMT560 08 X	h83038a	001	PROD		Agustin Velazquez		GMT560	
Panel Set: 1 schematic sheet1 12	$IVEDWORK/h83038a__001				Wednesday, April 19, 2006		Panel Set: 1	

Active Transfer Case (continued)



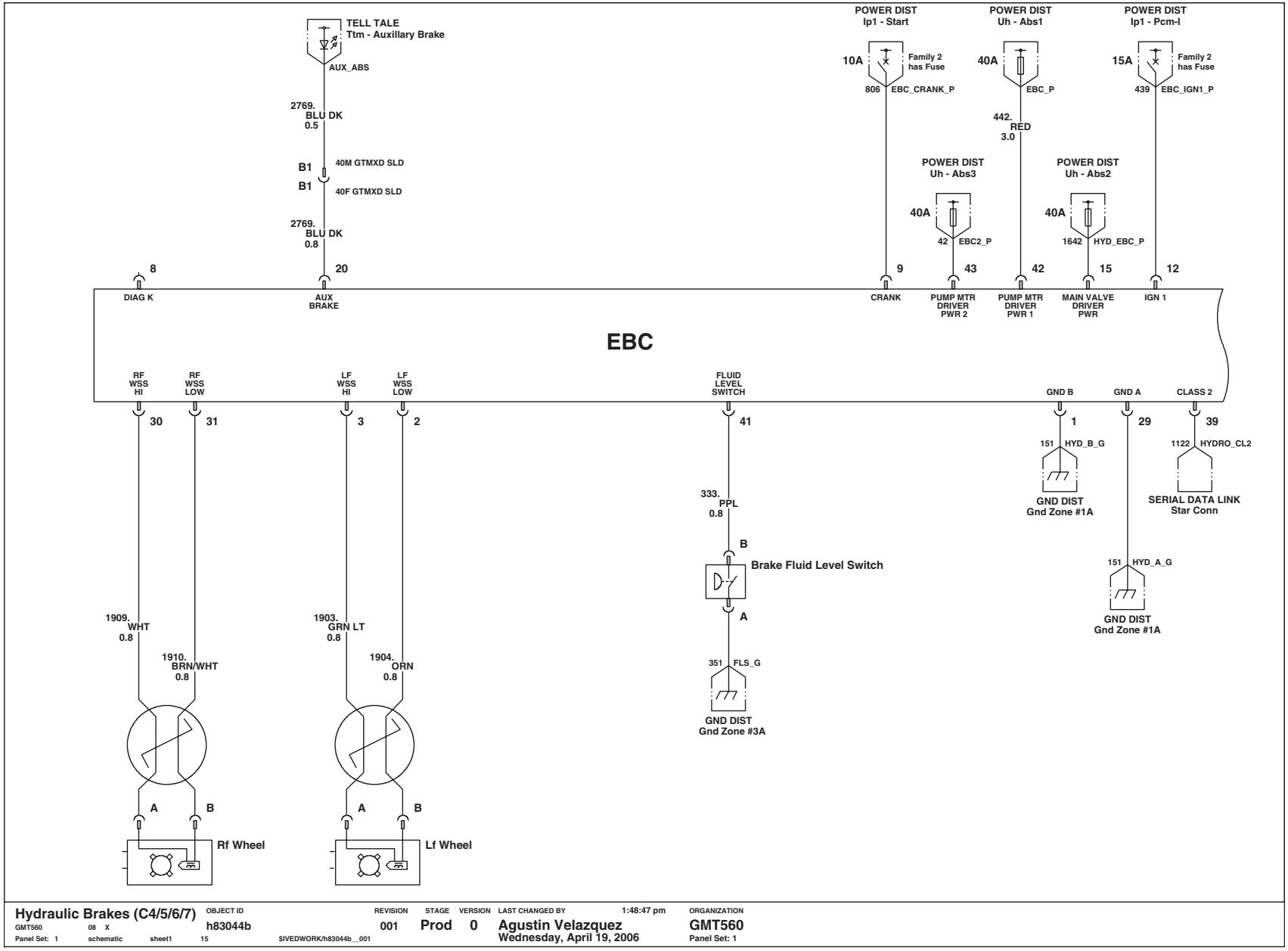
Active Transfer Case	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:46:50 pm	ORGANIZATION
GMT560 08 X	h83038a	001	PROD		Agustin Velazquez		GMT560
Panel Set: 2 schematic sheet1 12 $IVEDWORK/h83038a__001					Wednesday, April 19, 2006		Panel Set: 2

Horn

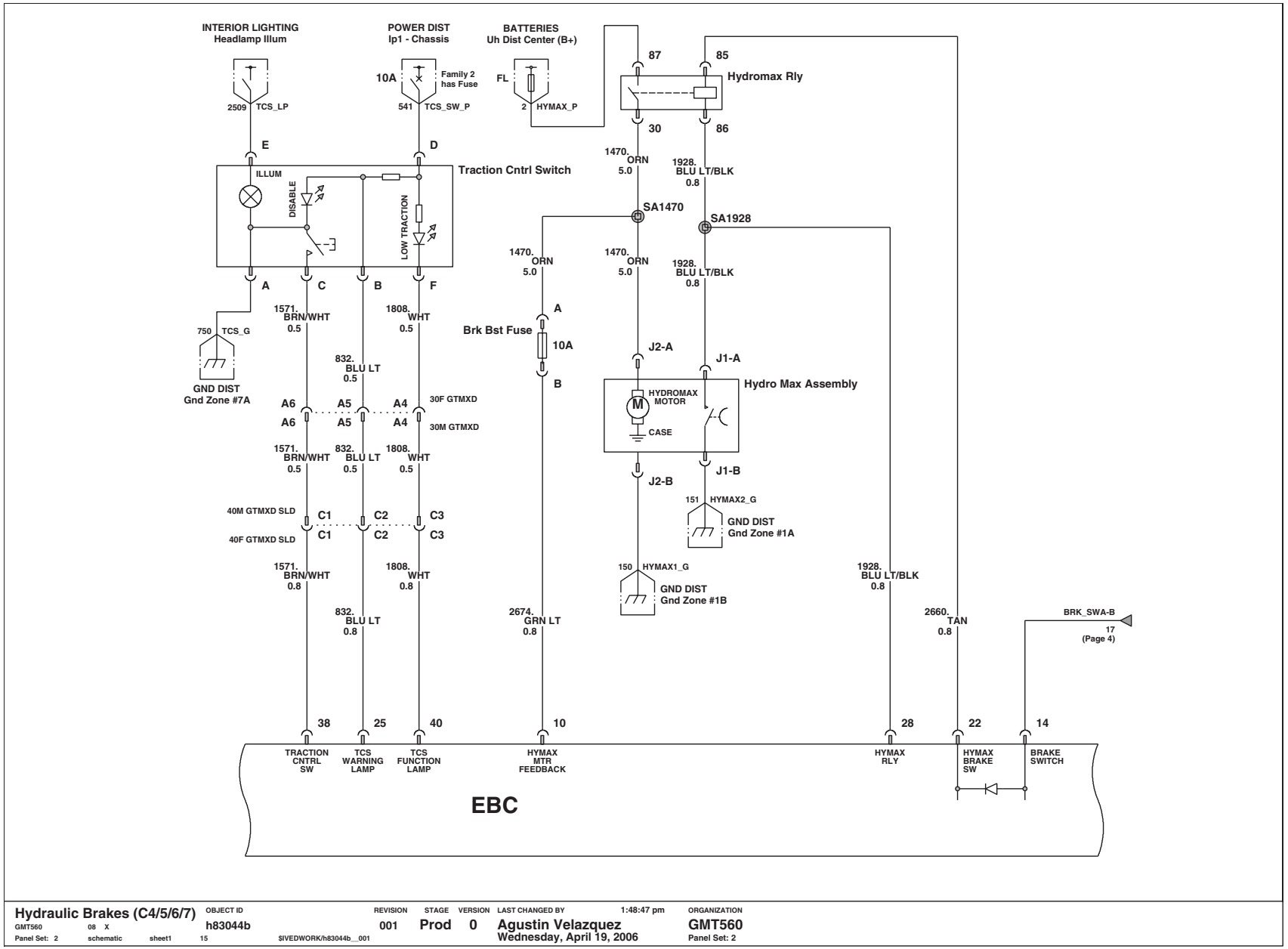


Horn		OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:47:12 pm	ORGANIZATION
GMT560	08 X	h83040a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 1	schematic sheet1 4	$IVEDWORK/h83040a__001				Wednesday, April 19, 2006		Panel Set: 1

Brakes - Hydraulic (C4500-C7500)



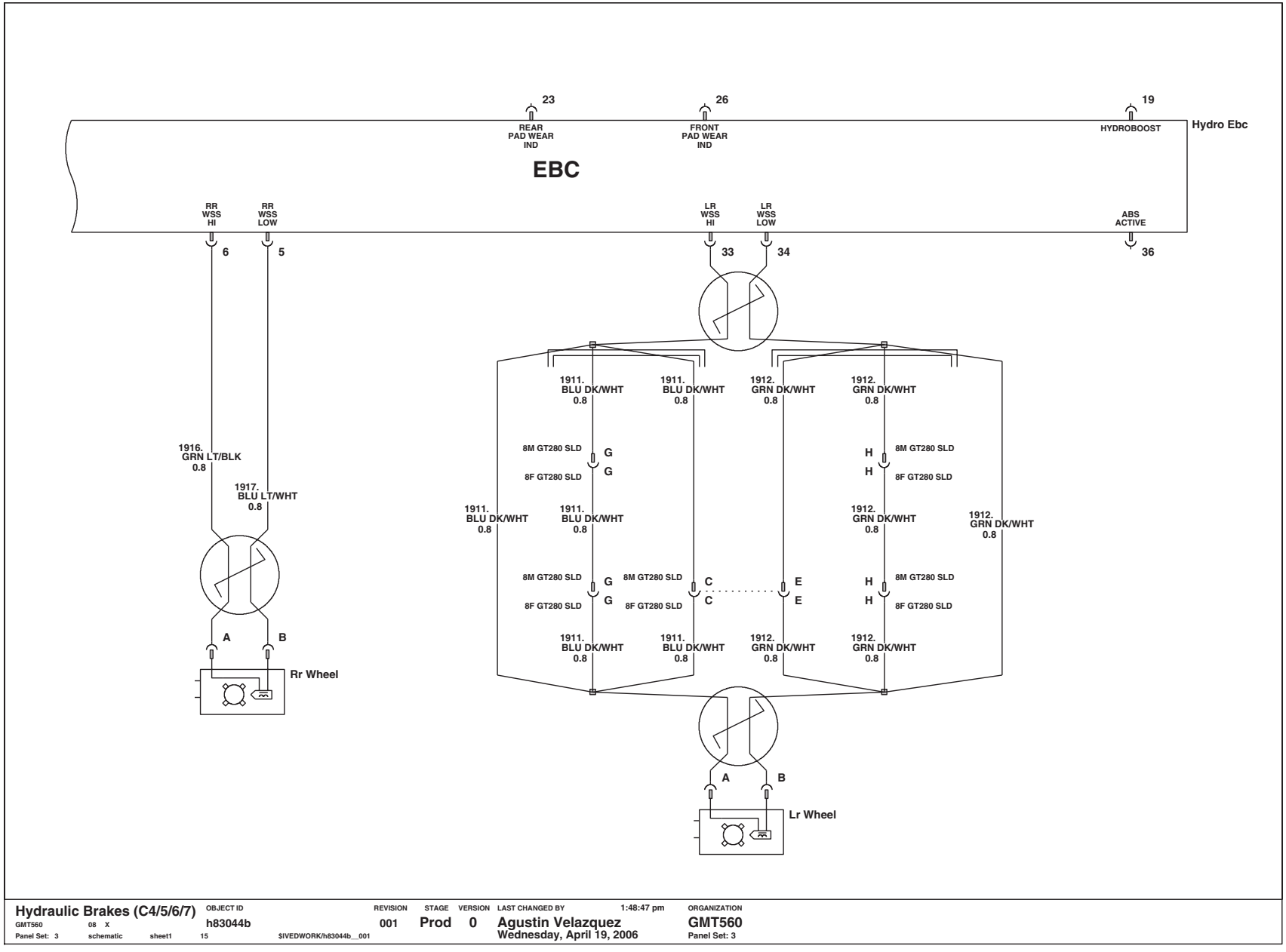
Brakes - Hydraulic (C4500-C7500) (continued)



Hydraulic Brakes (C4/5/6/7) OBJECT ID h83044b REVISION 001 STAGE Prod VERSION 0 LAST CHANGED BY Agustin Velazquez 1:48:47 pm Wednesday, April 19, 2006 ORGANIZATION GMT560

GMT560 08 X Panel Set: 2 schematic sheet1 15 $IVEDWORK/h83044b__001 Panel Set: 2

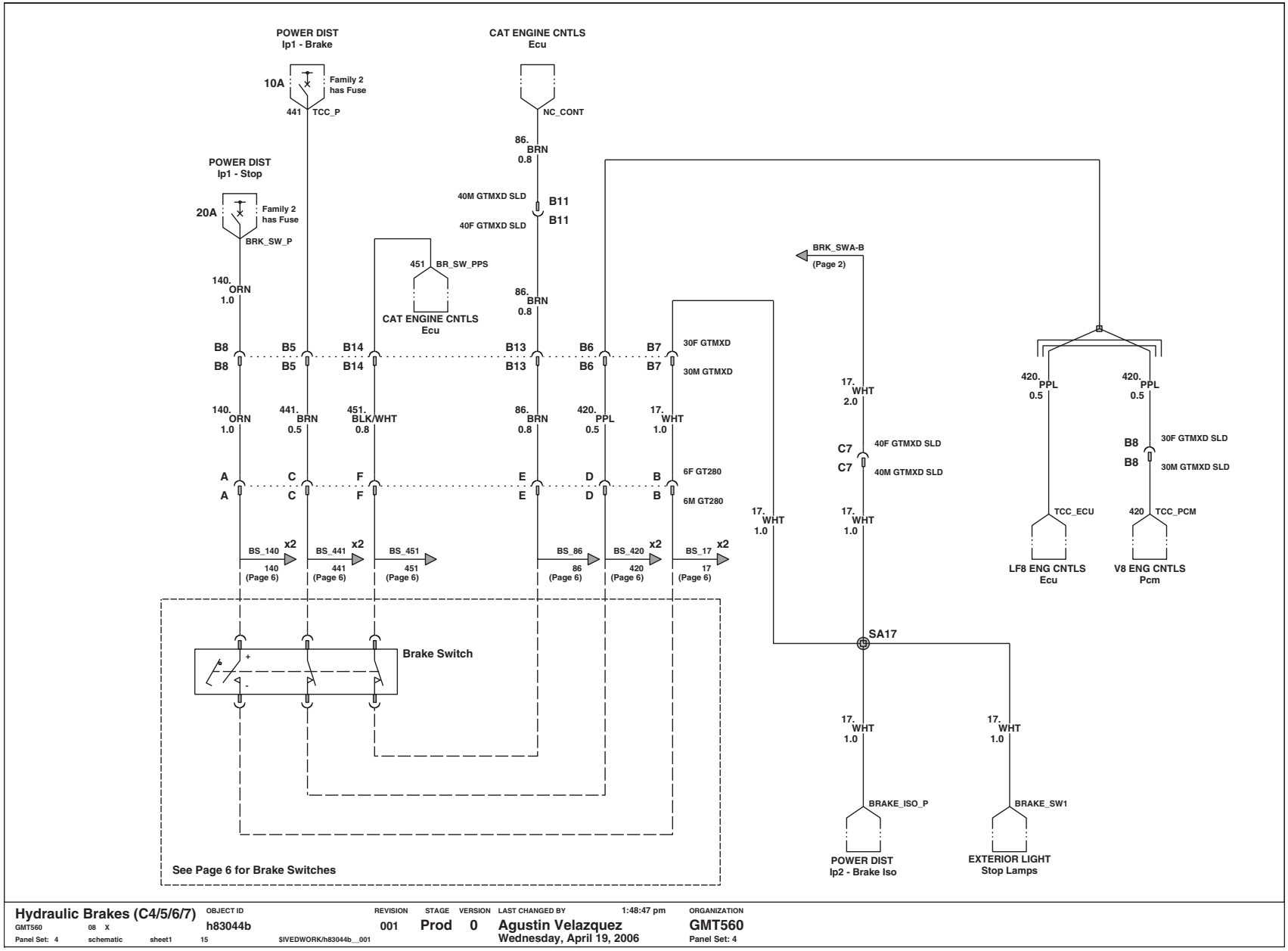
Brakes - Hydraulic (C4500-C7500) (continued)



Hydraulic Brakes (C4/5/6/7) OBJECT ID h83044b REVISION 001 STAGE Prod VERSION 0 LAST CHANGED BY Agustin Velazquez 1:48:47 pm Wednesday, April 19, 2006 ORGANIZATION GMT560

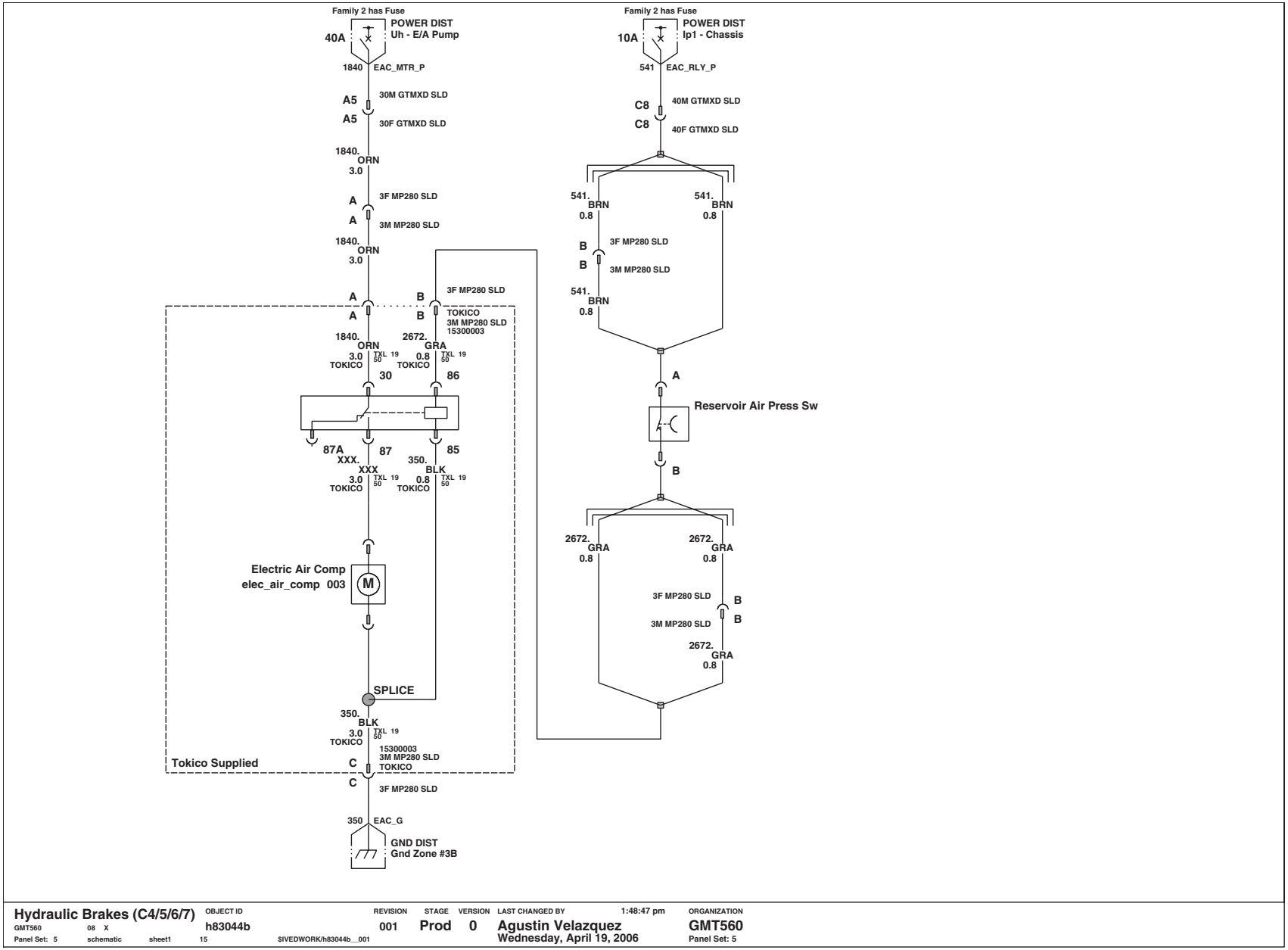
GMT560 08 X schematic sheet1 15 $IVEDWORK/h83044b__001 Panel Set: 3 Panel Set: 3

Brakes - Hydraulic (C4500-C7500) (continued)



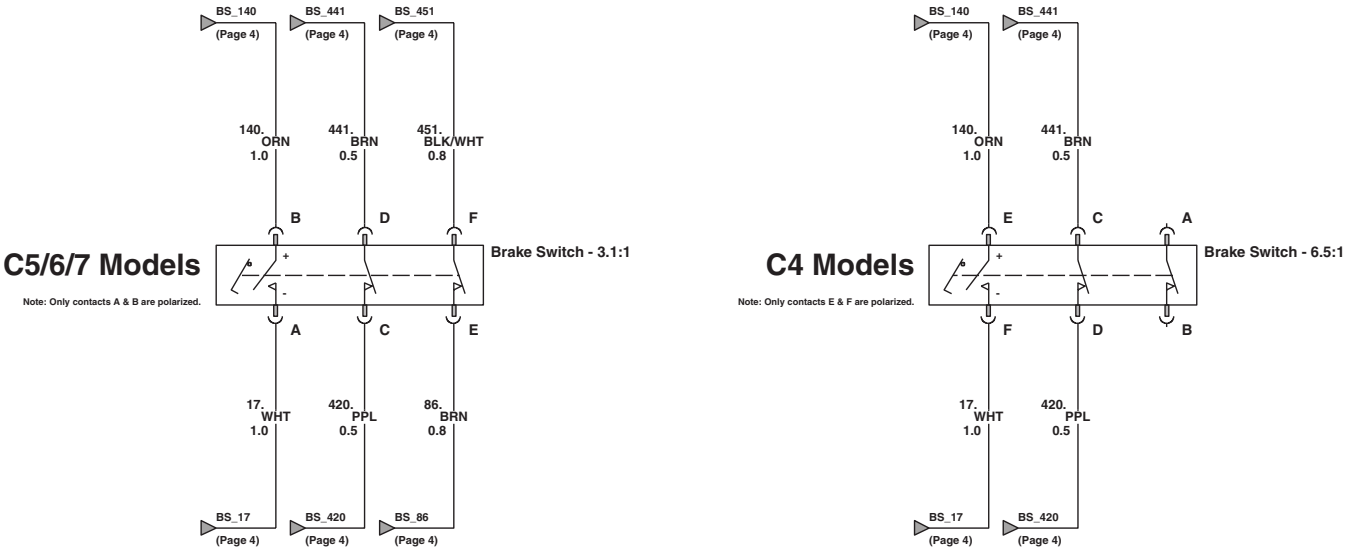
Hydraulic Brakes (C4/5/6/7)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83044b	001	Prod	0	Agustin Velazquez	1:48:47 pm	GMT560
Panel Set: 4 schematic sheet1 15	$IVEDWORK/h83044b__001				Wednesday, April 19, 2006		Panel Set: 4

Brakes - Hydraulic (C4500-C7500) (continued)



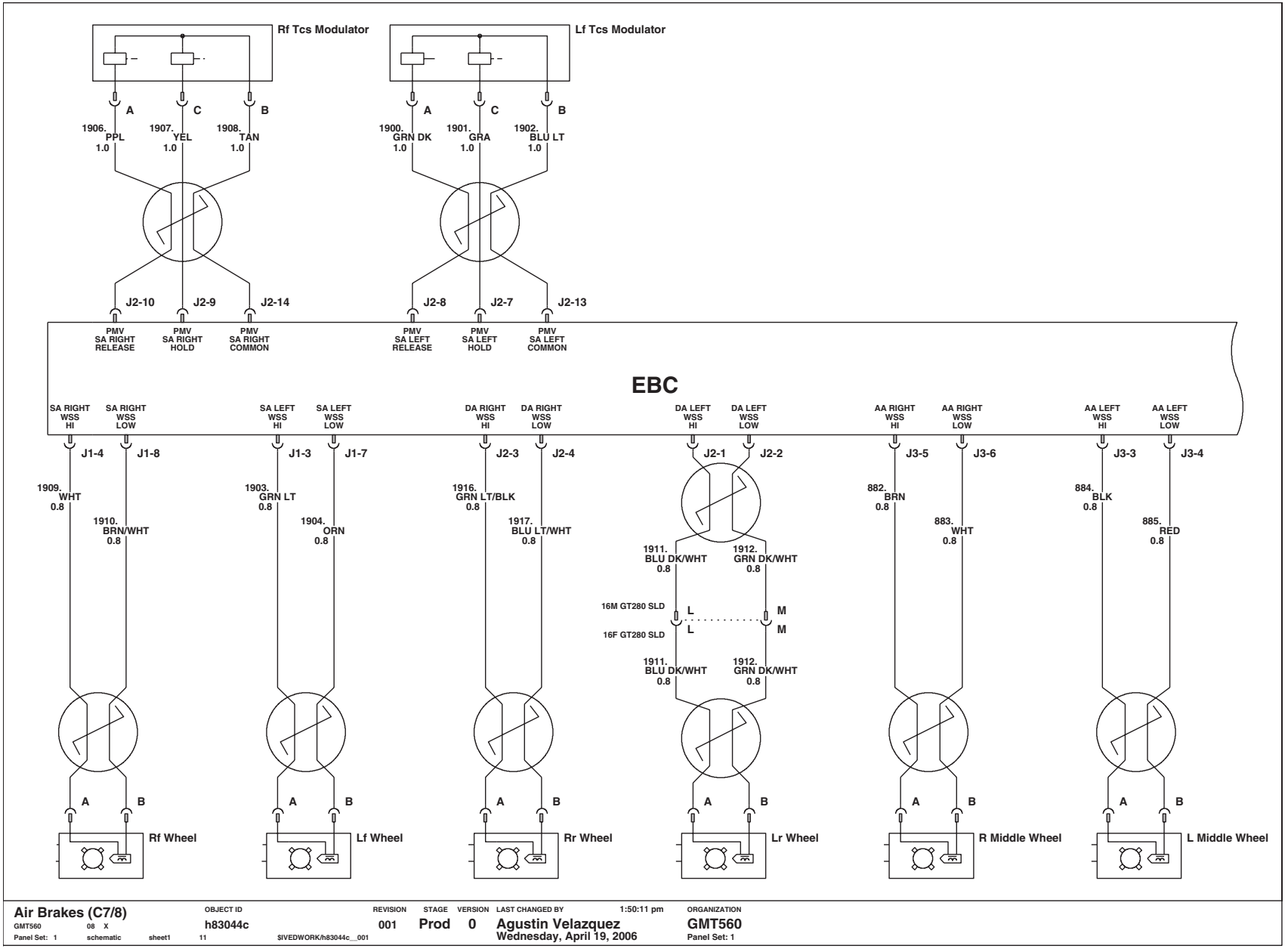
Hydraulic Brakes (C4/5/6/7)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:48:47 pm	ORGANIZATION
GMT560 08 X	h83044b	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 5 schematic sheet1 15	$IVEDWORK/h83044b__001				Wednesday, April 19, 2006		Panel Set: 5

Brakes - Hydraulic (C4500-C7500) (continued)



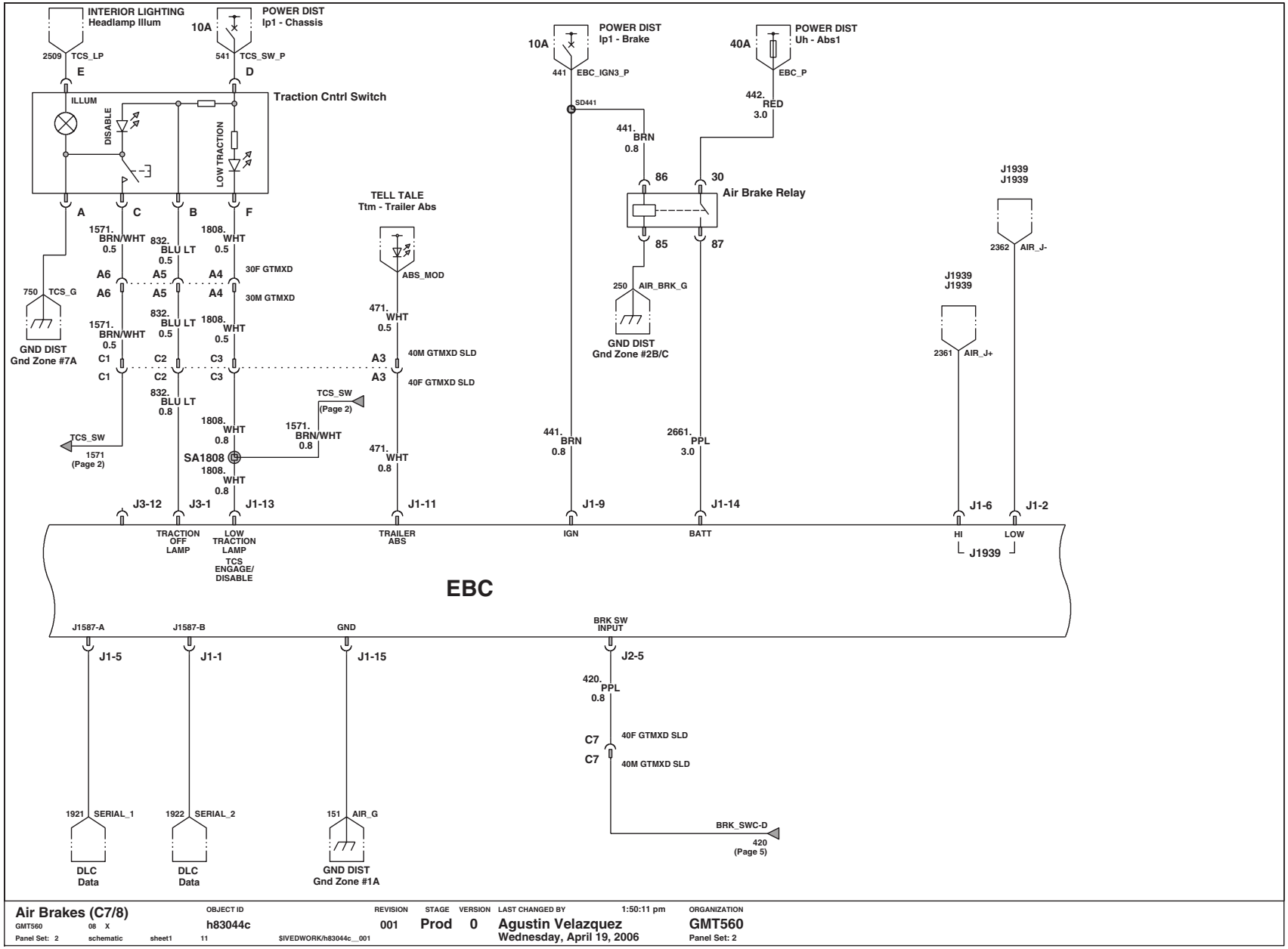
Hydraulic Brakes (C4/5/6/7)	OBJECT ID		REVISION	STAGE	VERSION	LAST CHANGED BY	1:48:47 pm	ORGANIZATION
GMT560 08 X	h83044b		001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 6 schematic sheet1 15	$IVEDWORK/h83044b__001					Wednesday, April 19, 2006		Panel Set: 6

Brakes - Air (C7500-C8500)

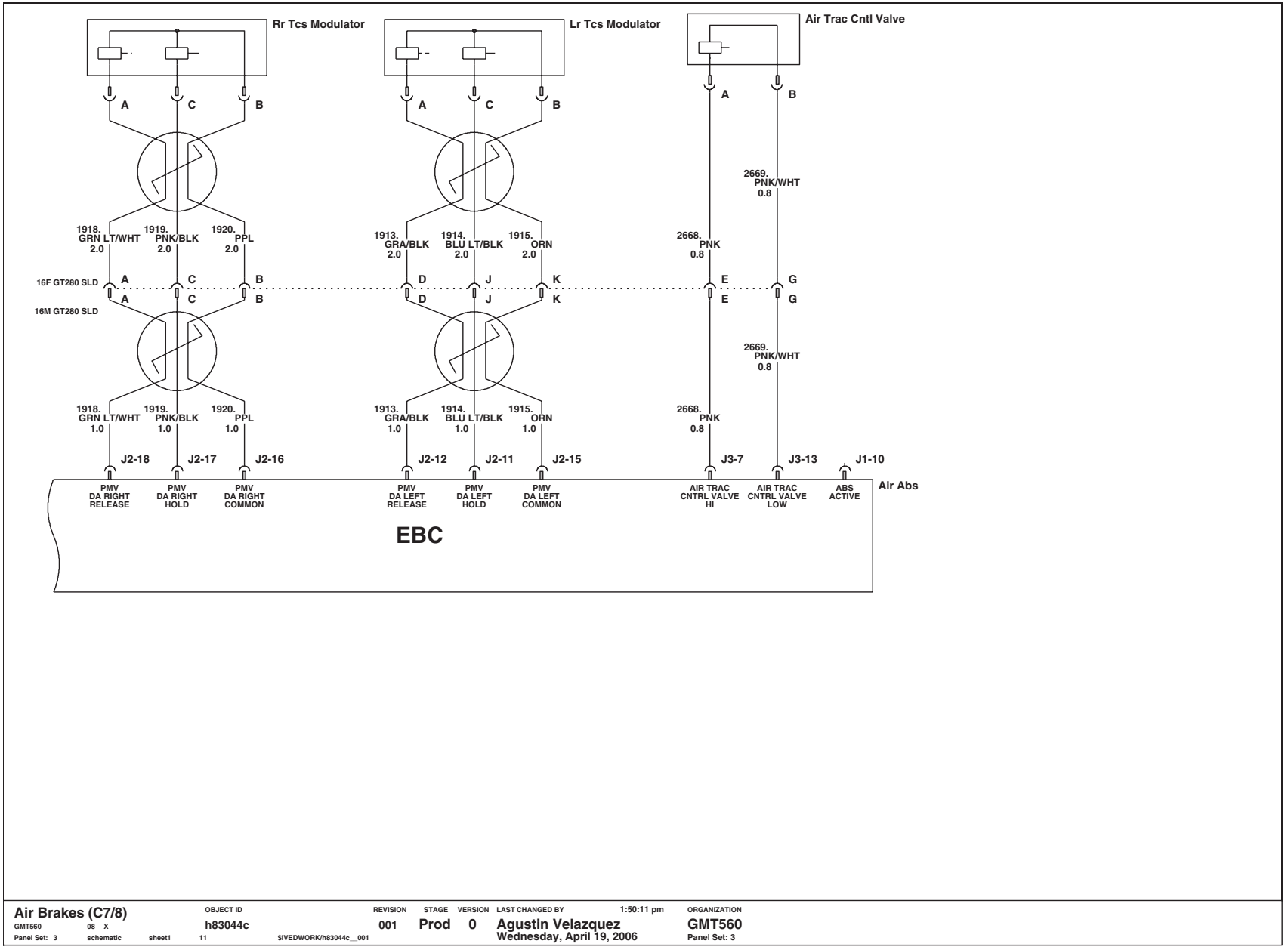


Air Brakes (C7/8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:50:11 pm	ORGANIZATION
GMT560 08 X	h83044c	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 11	$IVEDWORK/h83044c__001				Wednesday, April 19, 2006		Panel Set: 1

Brakes - Air (C7500-C8500) (continued)

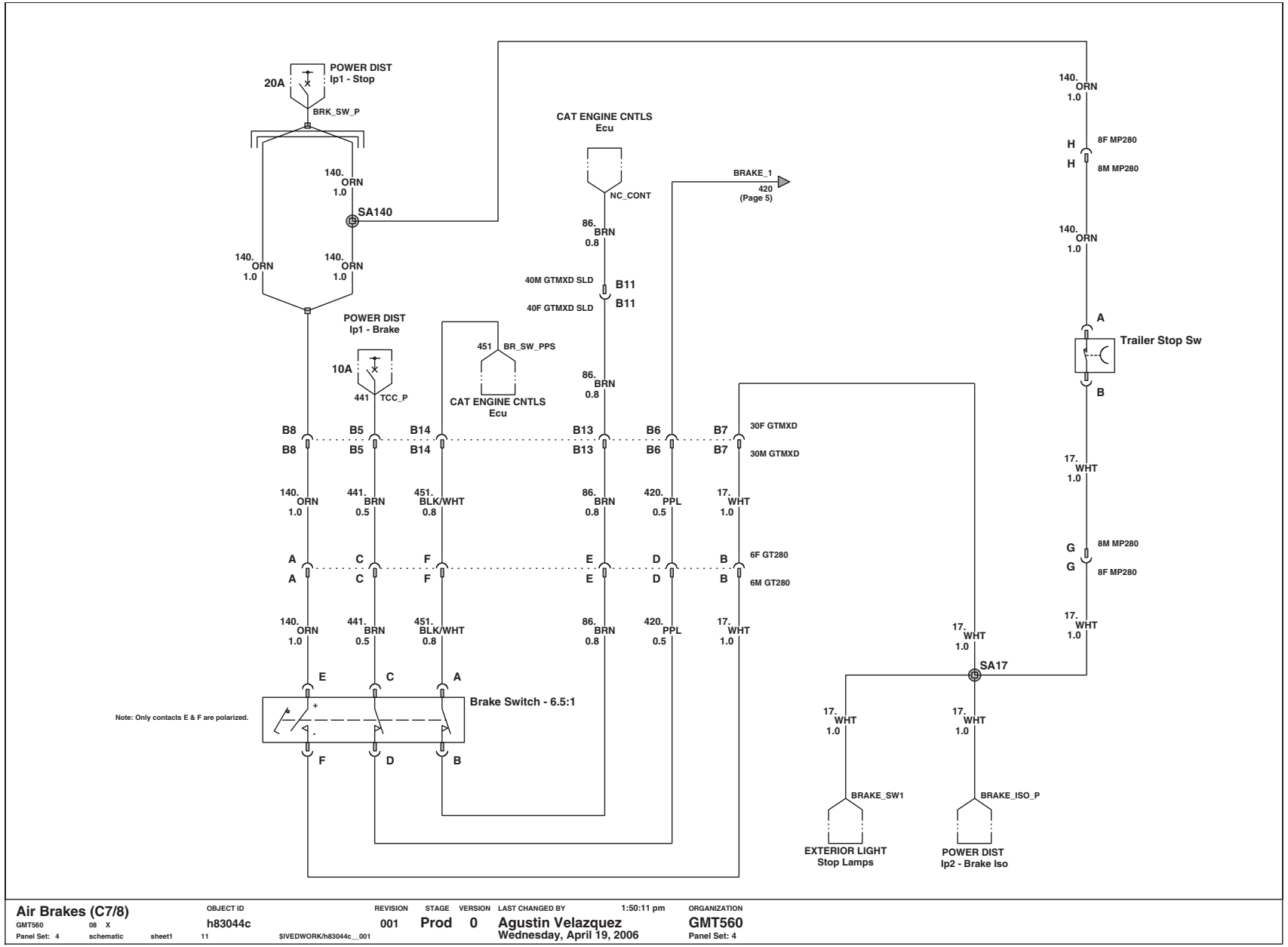


Brakes - Air (C7500-C8500) (continued)



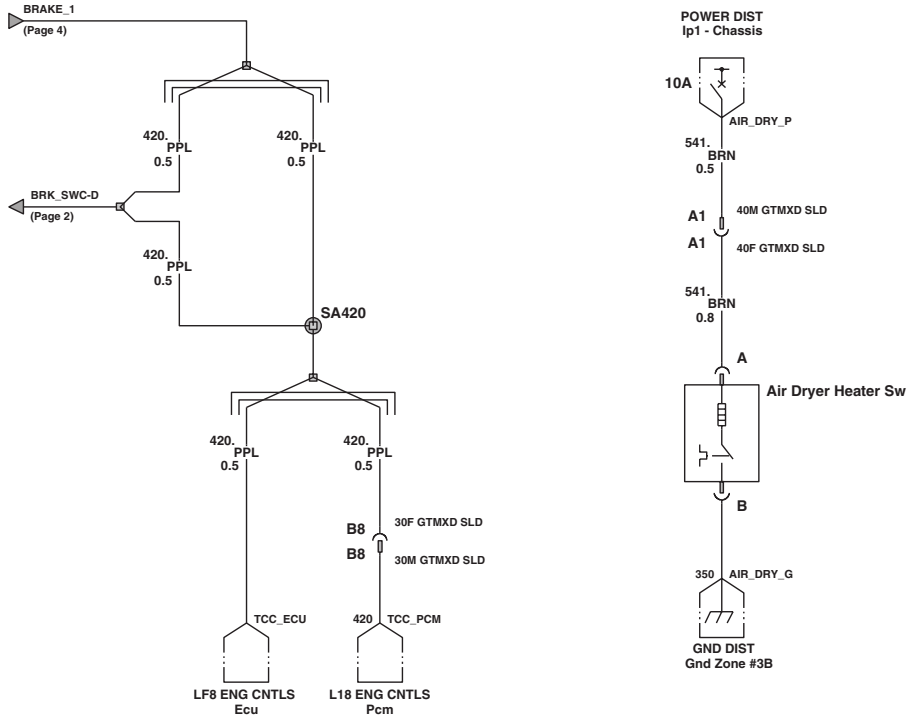
Air Brakes (C7/8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:50:11 pm	ORGANIZATION
GMT560 08 X	h83044c	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 3 schematic sheet1 11	$IVEDWORK/h83044c__001				Wednesday, April 19, 2006		Panel Set: 3

Brakes - Air (C7500-C8500) (continued)



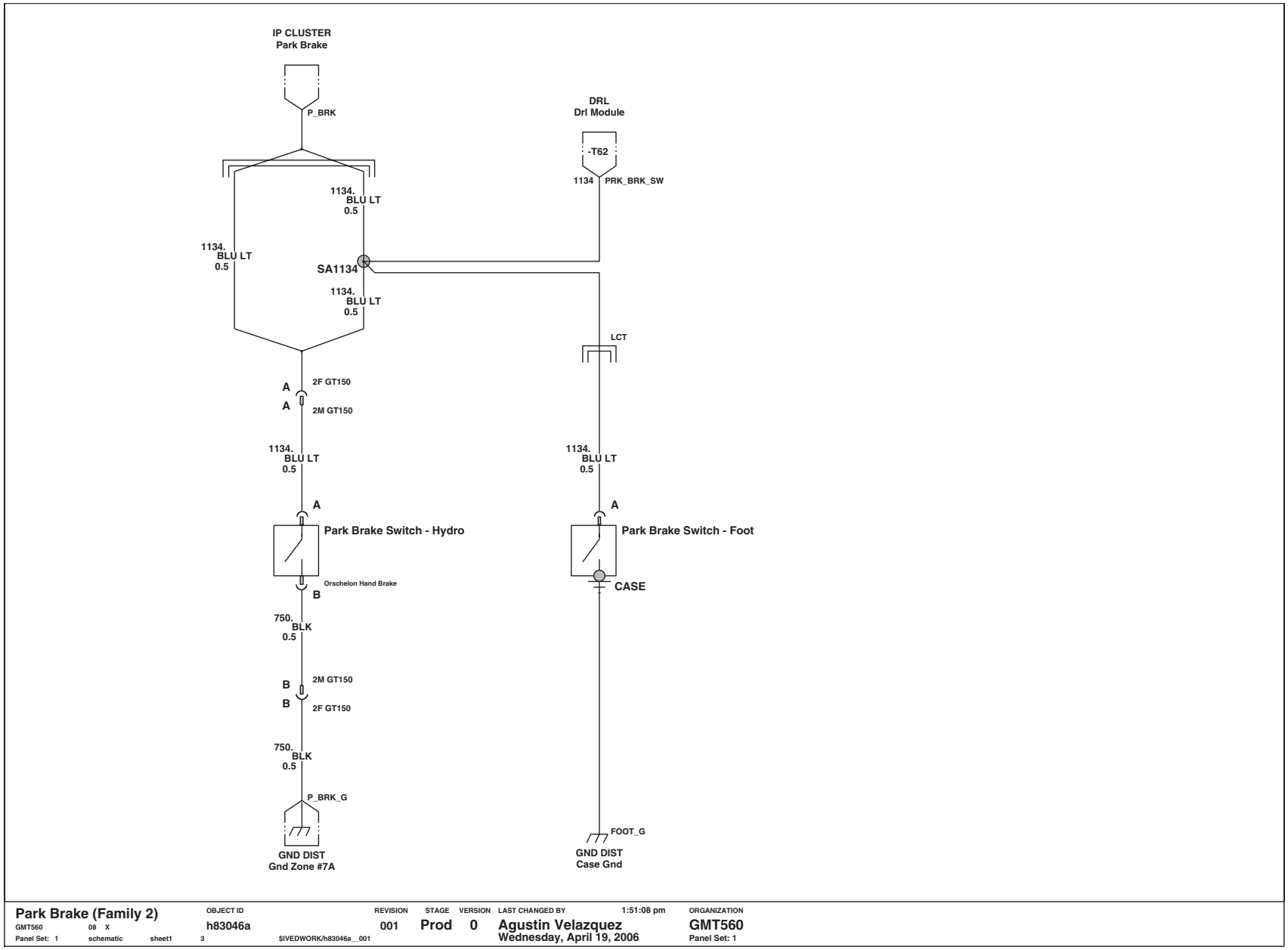
Air Brakes (C7/8)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:50:11 pm	ORGANIZATION
GMT560 08 X	h83044c	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 4 schematic sheet1 11	$IVEDWORK/h83044c__001				Wednesday, April 19, 2006		Panel Set: 4

Brakes - Air (C7500-C8500) (continued)

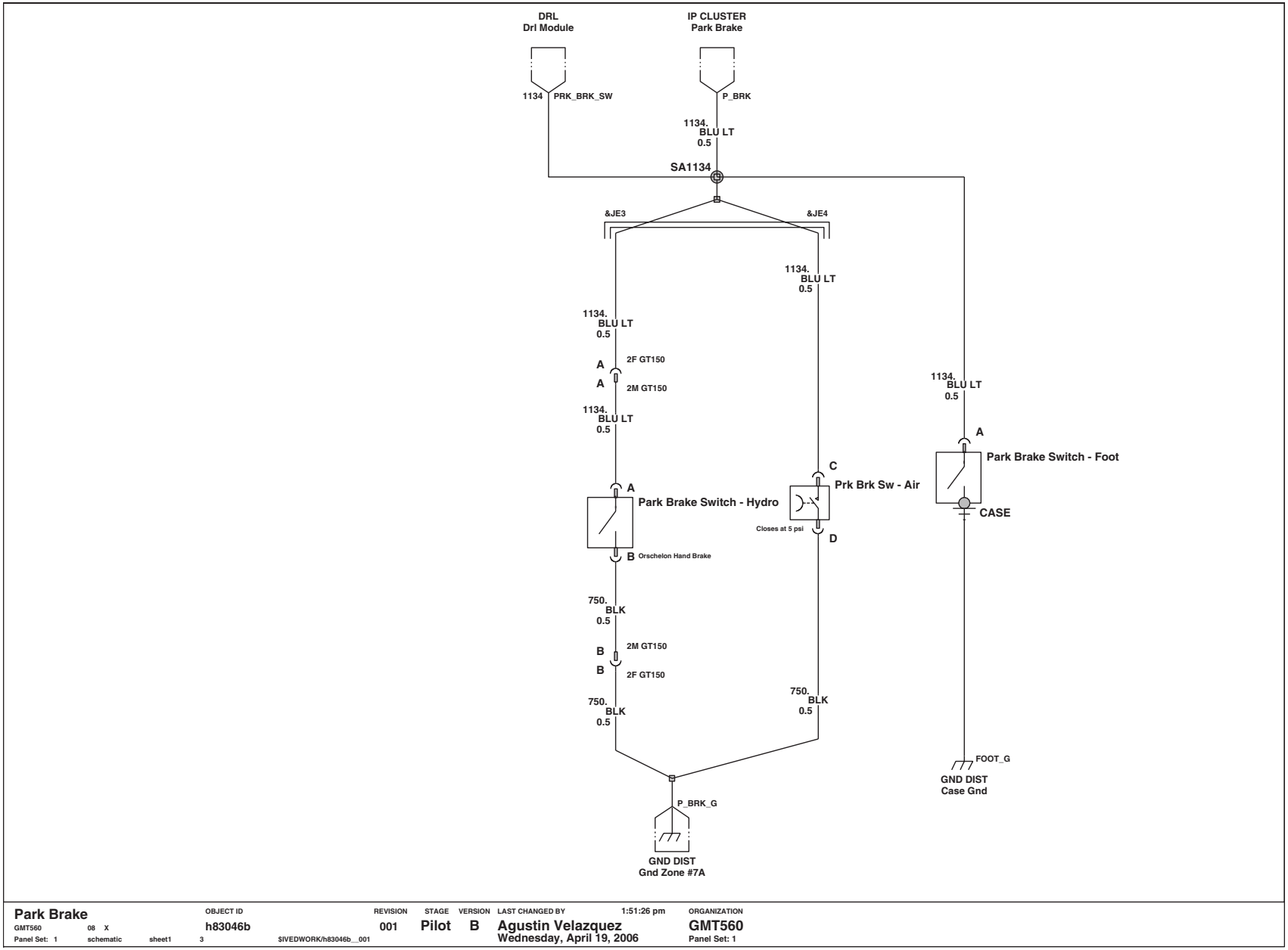


Air Brakes (C7/8)	OBJECT ID		REVISION	STAGE	VERSION	LAST CHANGED BY	1:50:11 pm	ORGANIZATION
GMT560 08 X	**h83044c**		**001**	**Prod**	**0**	**Agustin Velazquez**		**GMT560**
Panel Set: 5 schematic sheet1 11	$IVEDWORK/h83044c__001					**Wednesday, April 19, 2006**		Panel Set: 5

Park Brake (Family 2)

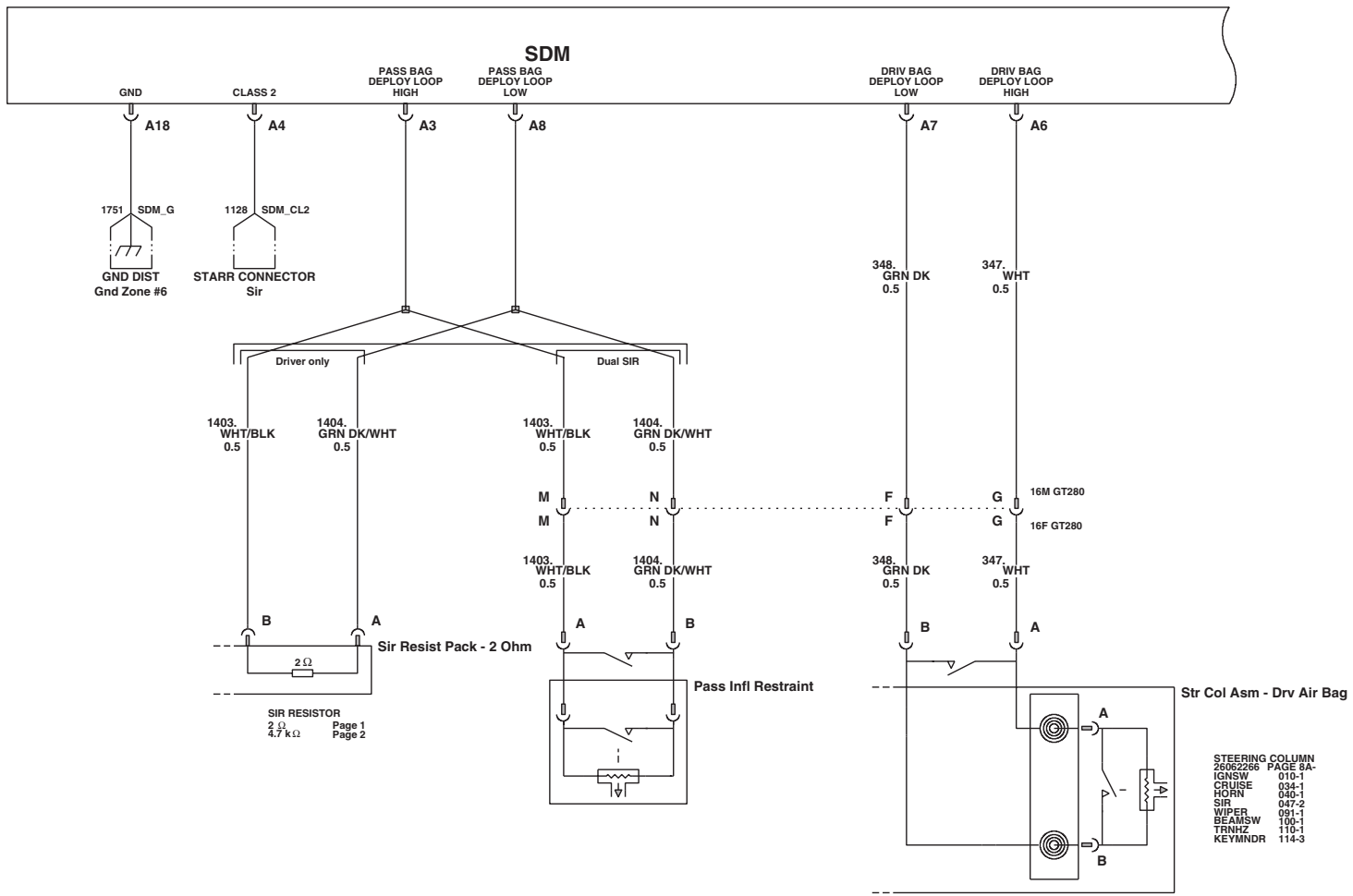


Park Brake (Family 3)



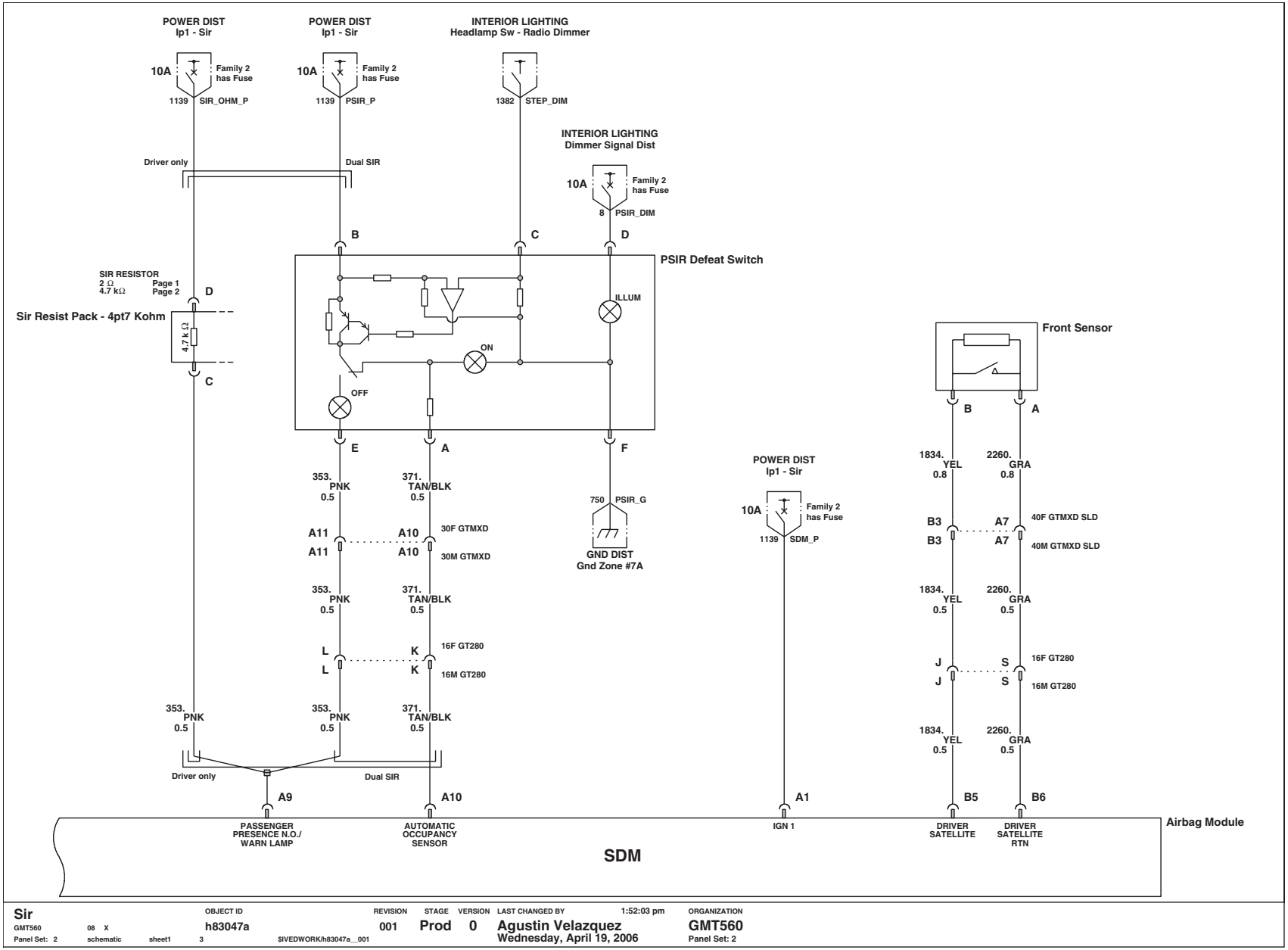
Park Brake	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:51:26 pm	ORGANIZATION
GMT560 08 X	h83046b	001	Pilot	B	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 3 $IVEDWORK/h83046b__001					Wednesday, April 19, 2006		Panel Set: 1

SIR



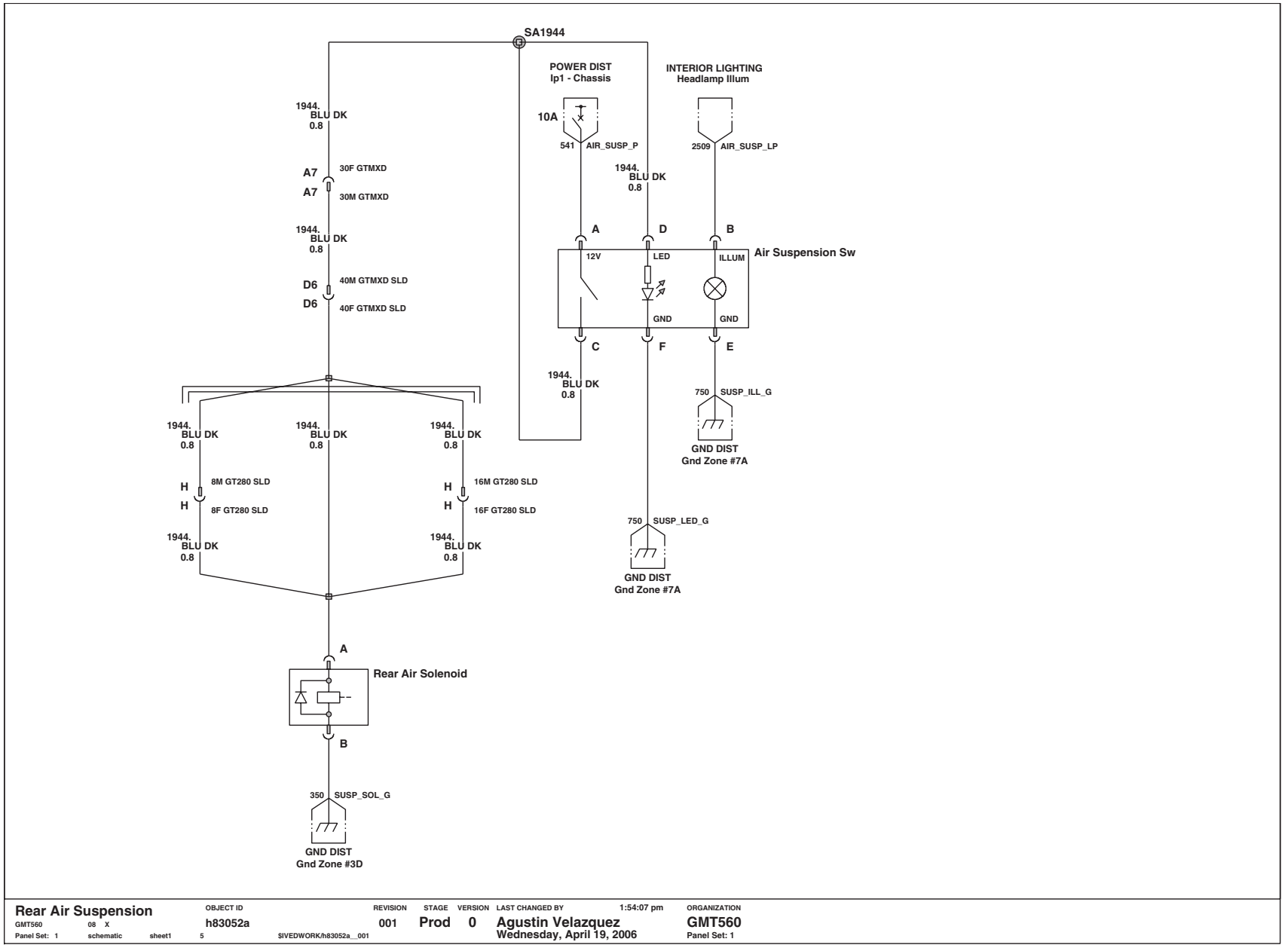
Sir	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:52:03 pm	ORGANIZATION
GMT560 08 X	h83047a	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83047a__001				Wednesday, April 19, 2006		Panel Set: 1

SIR (continued)



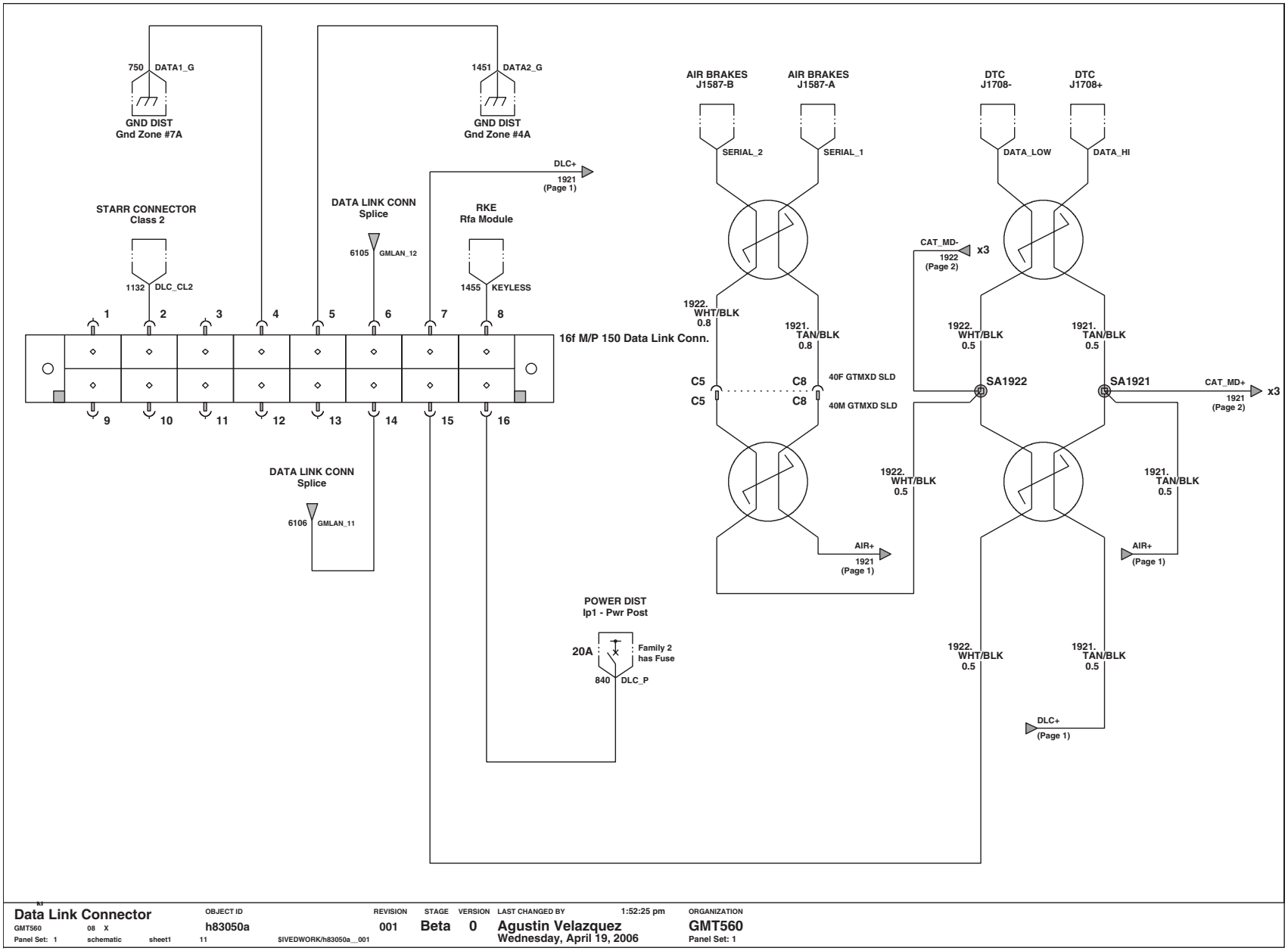
Sir	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:52:03 pm	ORGANIZATION
GMT560 08 X	h83047a	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 2 schematic sheet1 3	$IVEDWORK/h83047a__001				Wednesday, April 19, 2006		Panel Set: 2

Rear Air Suspension



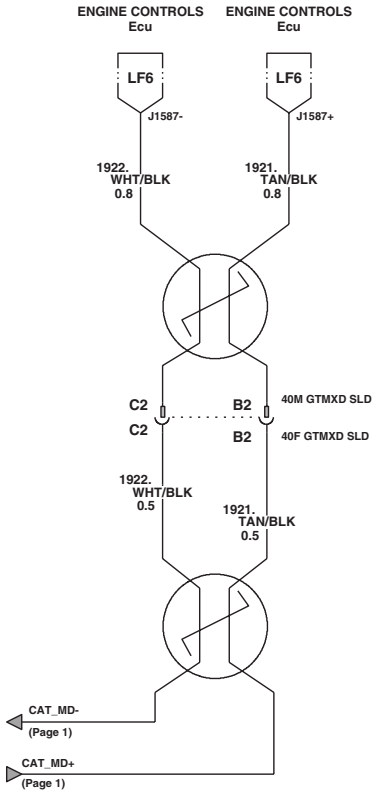
Rear Air Suspension	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:54:07 pm	ORGANIZATION
GMT560 08 X	h83052a	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 5	$IVEDWORK/h83052a__001				Wednesday, April 19, 2006		Panel Set: 1

Data Link Connector



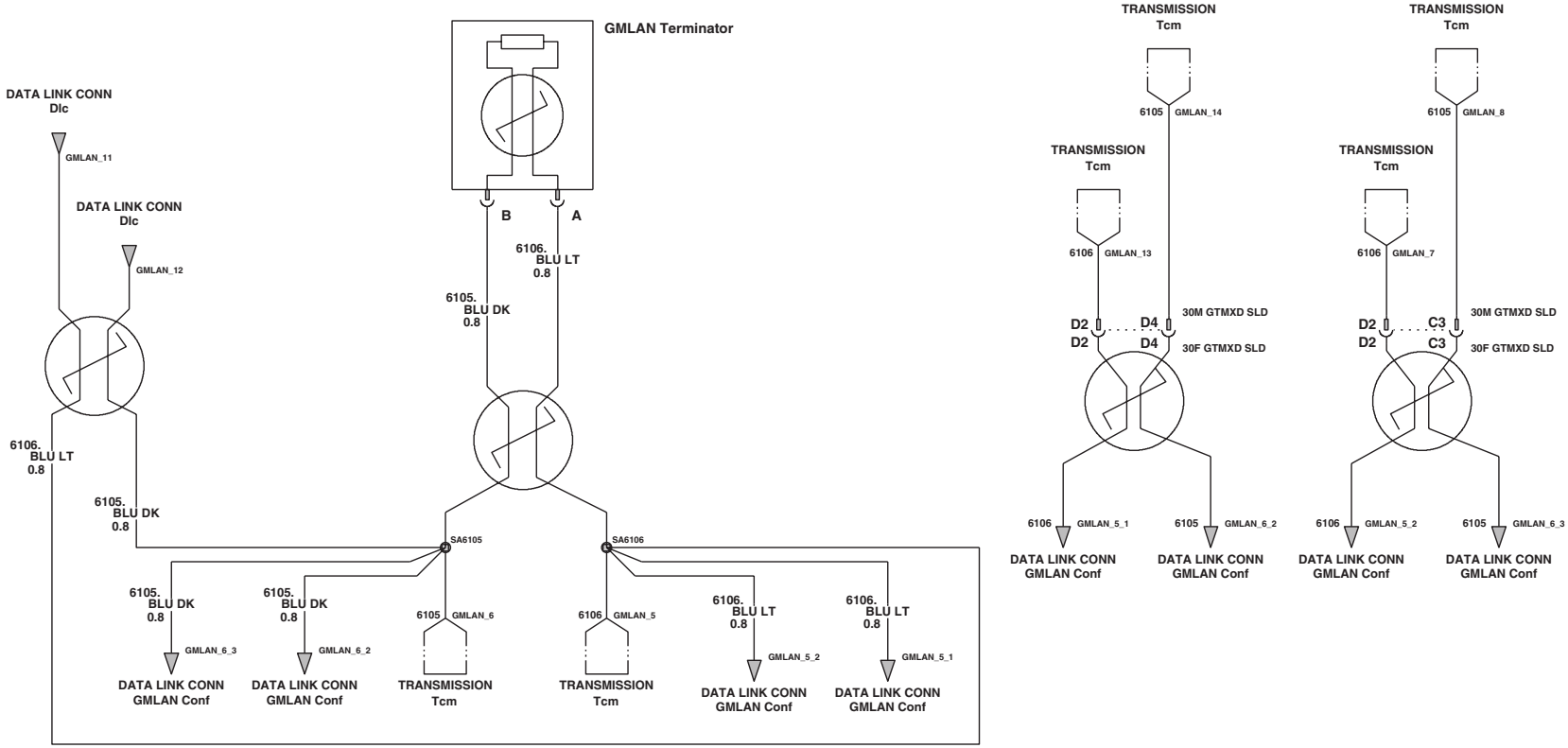
Data Link Connector	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83050a	001	Beta	0	Agustin Velazquez	1:52:25 pm	GMT560
Panel Set: 1 schematic sheet1 11	$IVEDWORK/h83050a__001				Wednesday, April 19, 2006		Panel Set: 1

Data Link Connector (continued)



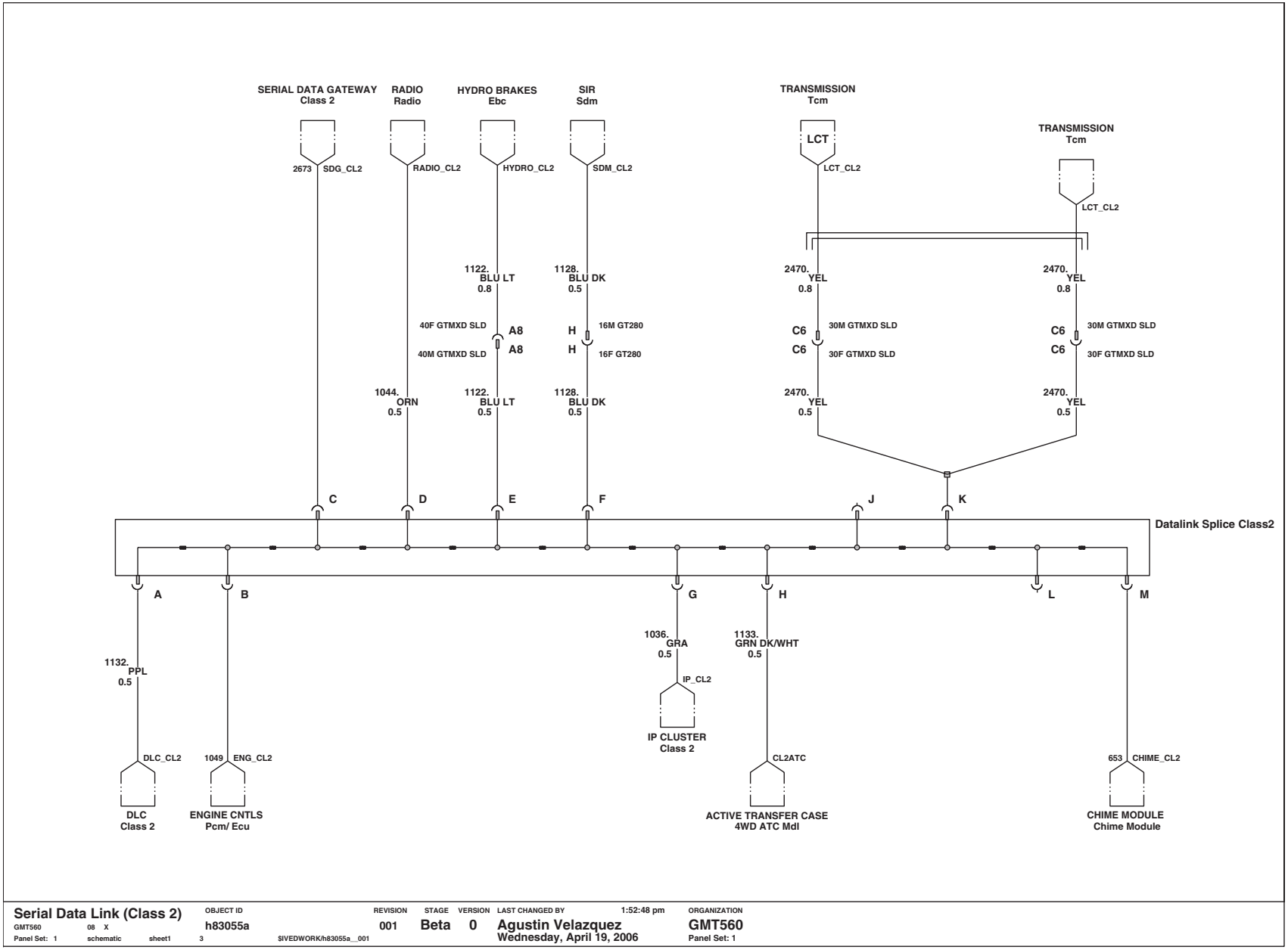
Data Link Connector	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:52:25 pm	ORGANIZATION
GMT560 08 X	h83050a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 2 schematic sheet1 11	$IVEDWORK/h83050a__001				Wednesday, April 19, 2006		Panel Set: 2

Data Link Connector (continued)



Data Link Connector		OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	ORGANIZATION
GMT560	08 X	h83050a	001	X	0	Agustin Velazquez	GMT560
Panel Set: 3	schematic sheet1 11	$IVEDWORK/h83050a__001				Wednesday, April 19, 2006 1:52:25 pm	Panel Set: 3

Serial Data Link (Class 2)

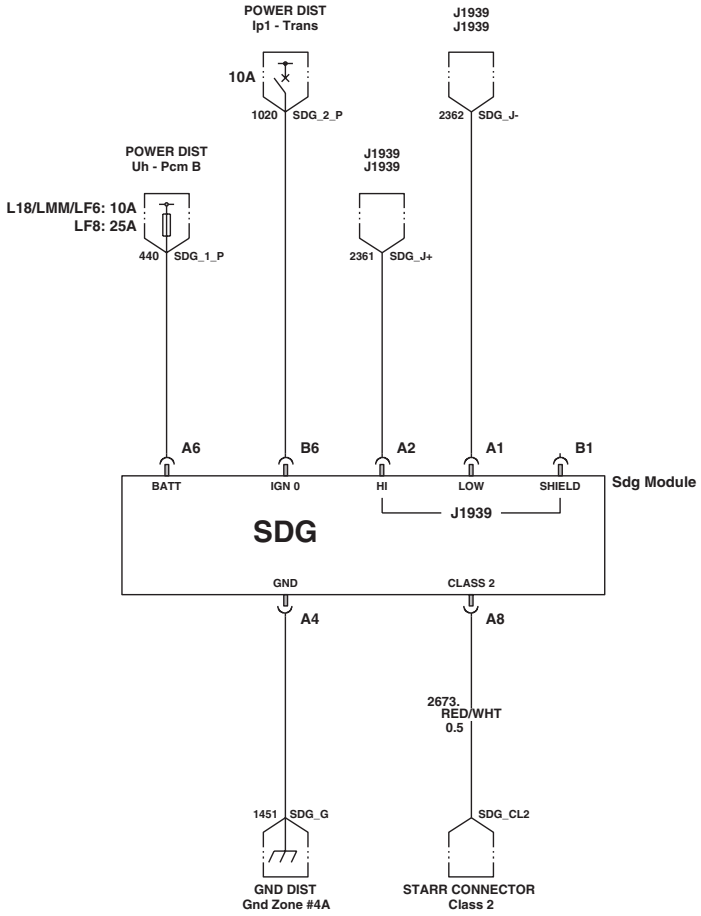


Serial Data Link (Class 2) OBJECT ID REVISION STAGE VERSION LAST CHANGED BY 1:52:48 pm ORGANIZATION

GMT560 08 X h83055a 001 Beta 0 Agustin Velazquez GMT560

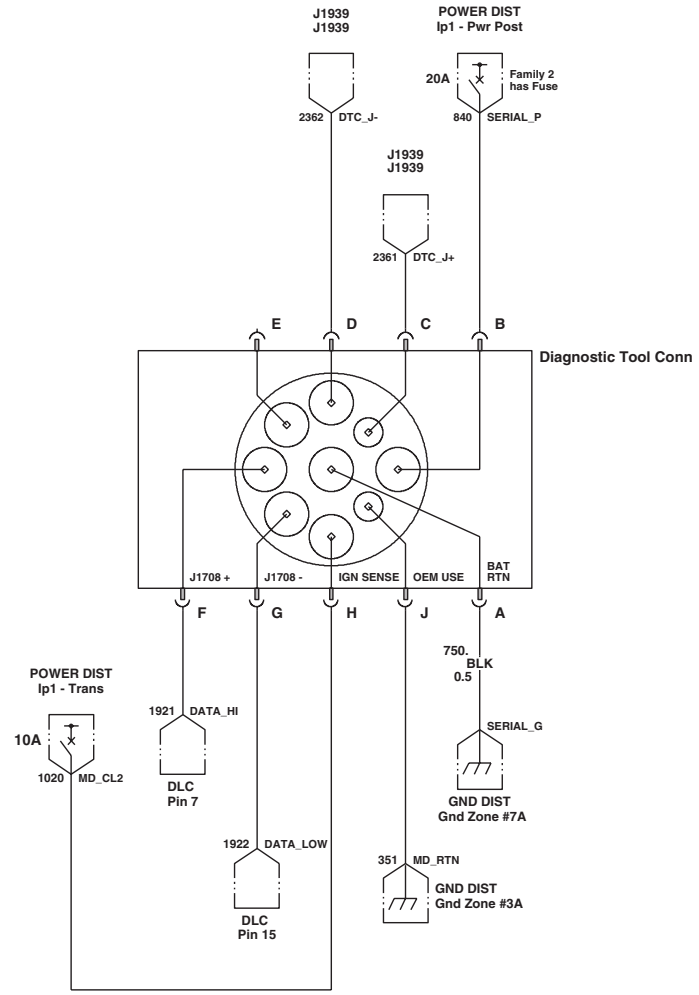
Panel Set: 1 schematic sheet1 3 $IVEDWORK/h83055a__001 Wednesday, April 19, 2006 Panel Set: 1

Serial Data Gateway



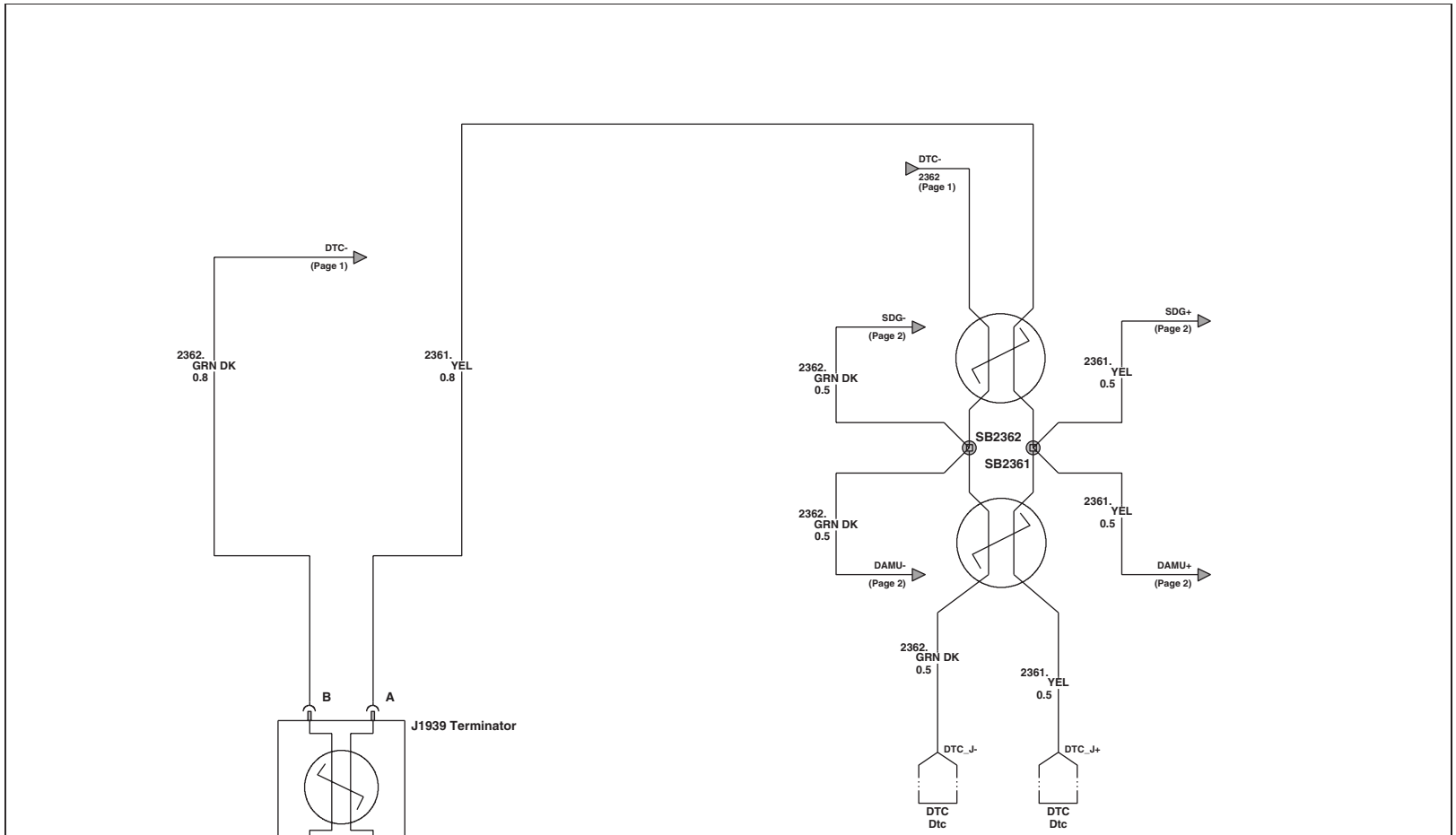
Serial Data Gateway	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:53:23 pm	ORGANIZATION
GMT560 08 X	h83056a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 10	$IVEDWORK/h83056a__001				Wednesday, April 19, 2006		Panel Set: 1

Diagnostic Tool Connector



Diagnostic Tool Connector	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83055b	001	Pilot	B	Agustin Velazquez	1:53:06 pm	GMT560
Panel Set: 1 schematic sheet1 2 $IVEDWORK/h83055b__001					Wednesday, April 19, 2006		Panel Set: 1

J1939 - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LF8) 7.8L L6 Isuzu 6H - Diesel – (LF6) 7.2L L6 Caterpillar® C7 - Diesel

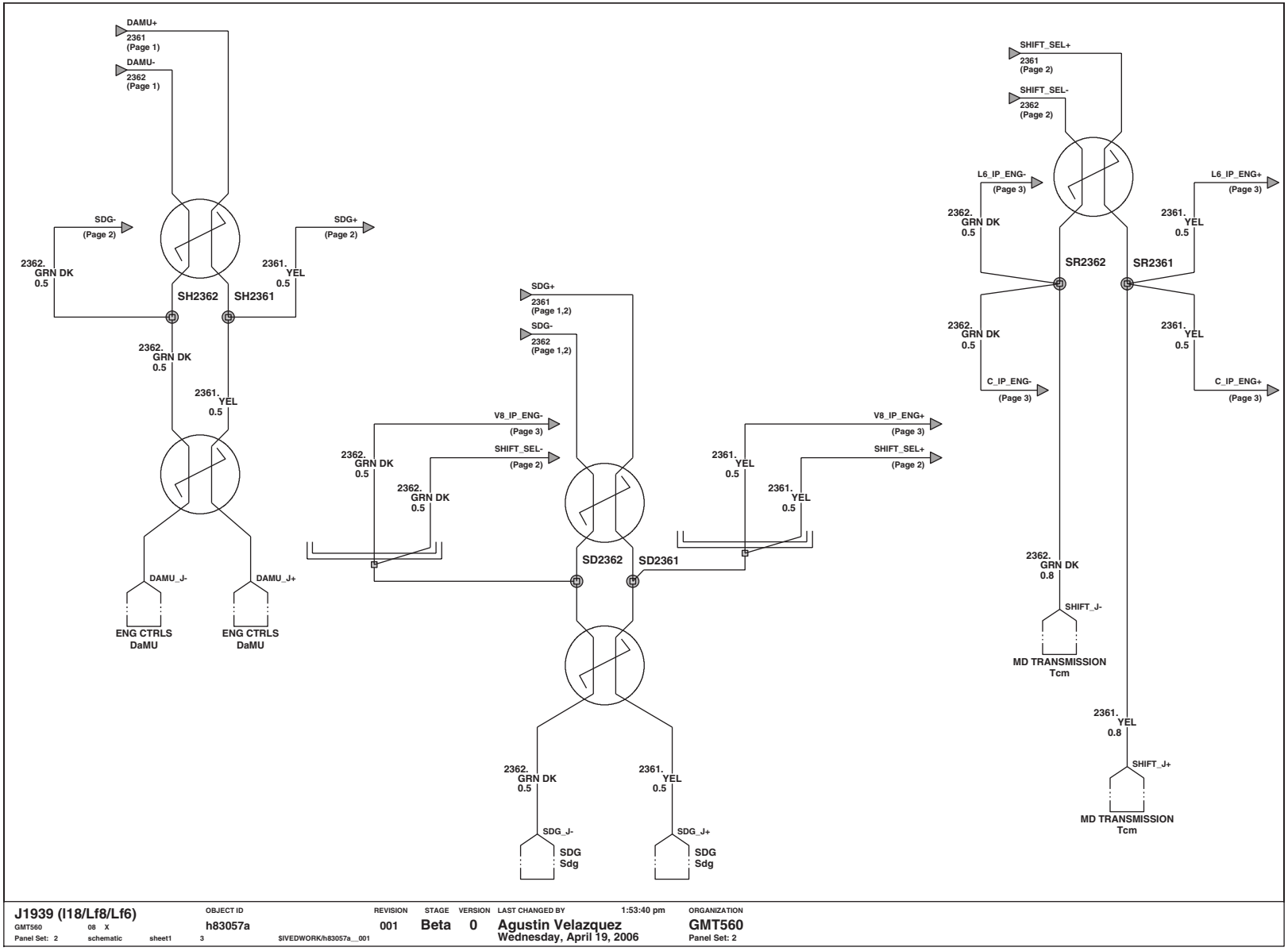


J1939 (I18/Lf8/Lf6) | OBJECT ID | REVISION | STAGE | VERSION | LAST CHANGED BY | 1:53:40 pm | ORGANIZATION

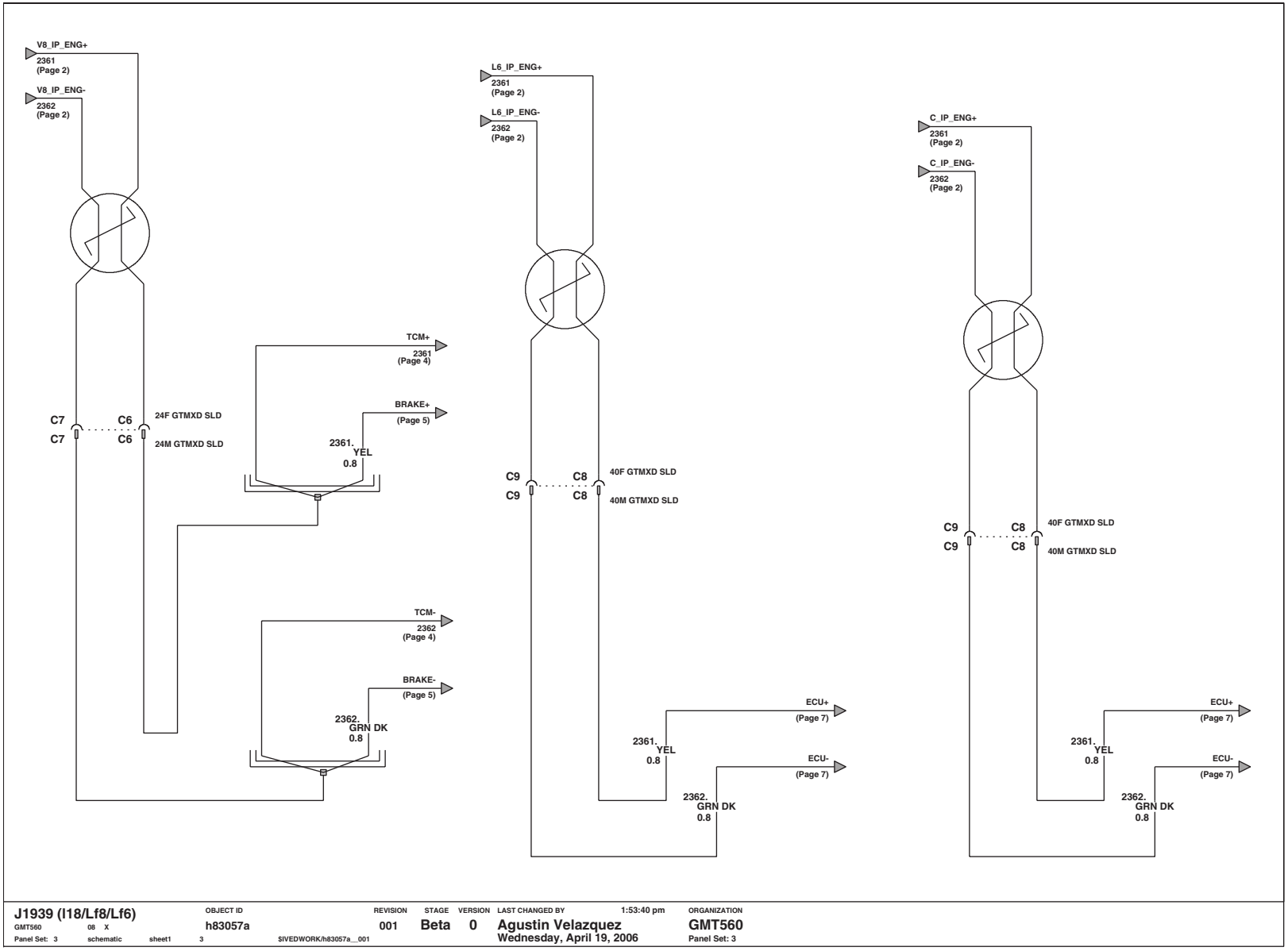
GMT560 08 X | h83057a | 001 | Beta | 0 | Agustin Velazquez | GMT560

Panel Set: 1 schematic sheet1 3 $IVEDWORK/h83057a__001 | Wednesday, April 19, 2006 | Panel Set: 1

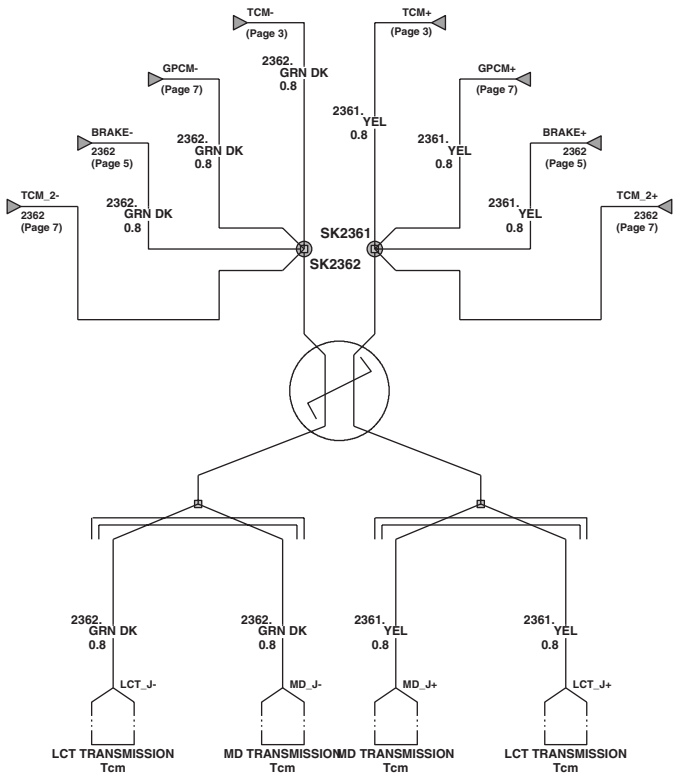
J1939 - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LF8) 7.8L L6 Isuzu 6H - Diesel – (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



J1939 - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LF8) 7.8L L6 Isuzu 6H - Diesel – (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



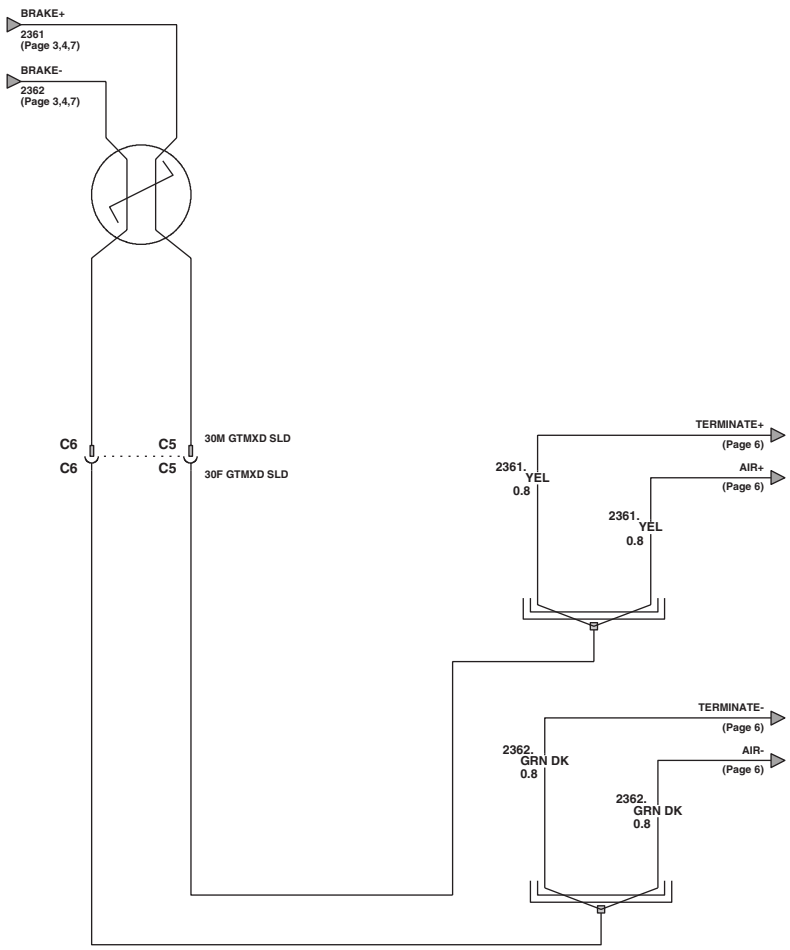
J1939 - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LF8) 7.8L L6 Isuzu 6H - Diesel – (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



J1939 (I18/Lf8/Lf6) | OBJECT ID h83057a | REVISION 001 | STAGE Beta | VERSION 0 | LAST CHANGED BY Agustin Velazquez | 1:53:40 pm Wednesday, April 19, 2006 | ORGANIZATION GMT560 Panel Set: 4

GMT560 08 X Panel Set: 4 schematic sheet1 3 $IVEDWORK/h83057a__001

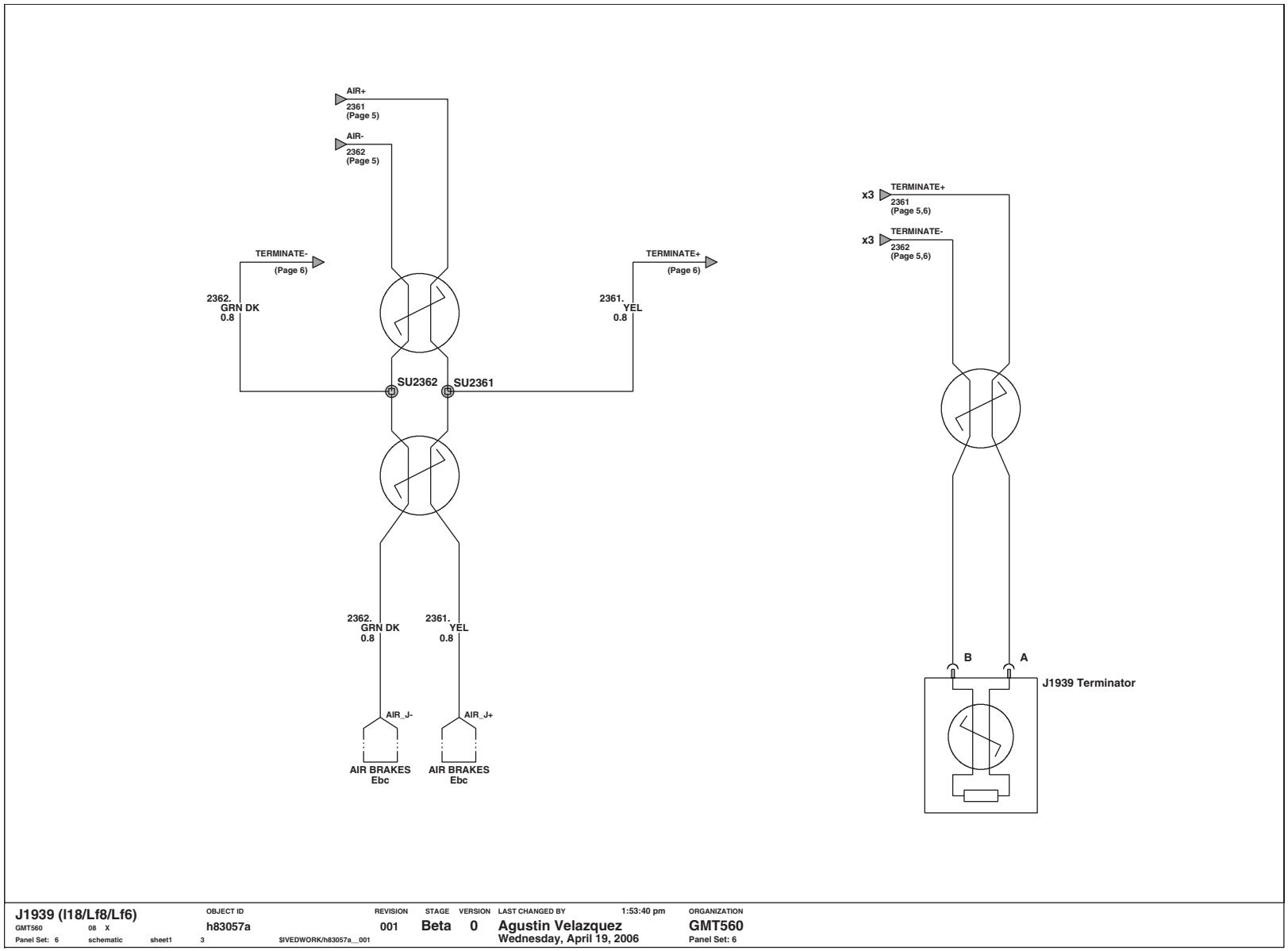
J1939 - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LF8) 7.8L L6 Isuzu 6H - Diesel – (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



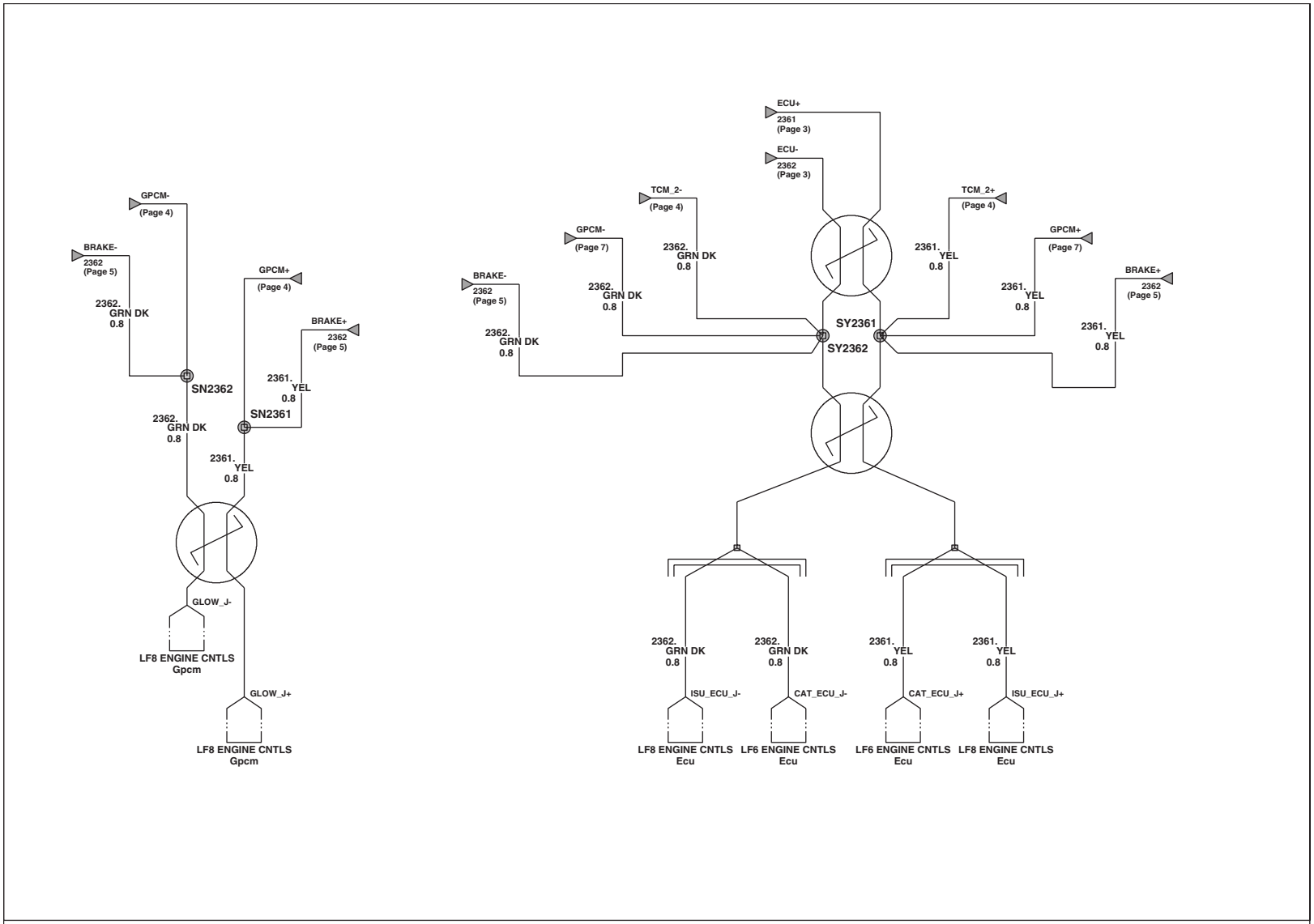
J1939 (I18/Lf8/Lf6) | OBJECT ID h83057a | REVISION 001 | STAGE Beta | VERSION 0 | LAST CHANGED BY Agustin Velazquez | 1:53:40 pm Wednesday, April 19, 2006 | ORGANIZATION GMT560 | Panel Set: 5

GMT560 08 X | Panel Set: 5 schematic sheet1 3 $IVEDWORK/h83057a__001

J1939 - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LF8) 7.8L L6 Isuzu 6H - Diesel – (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)

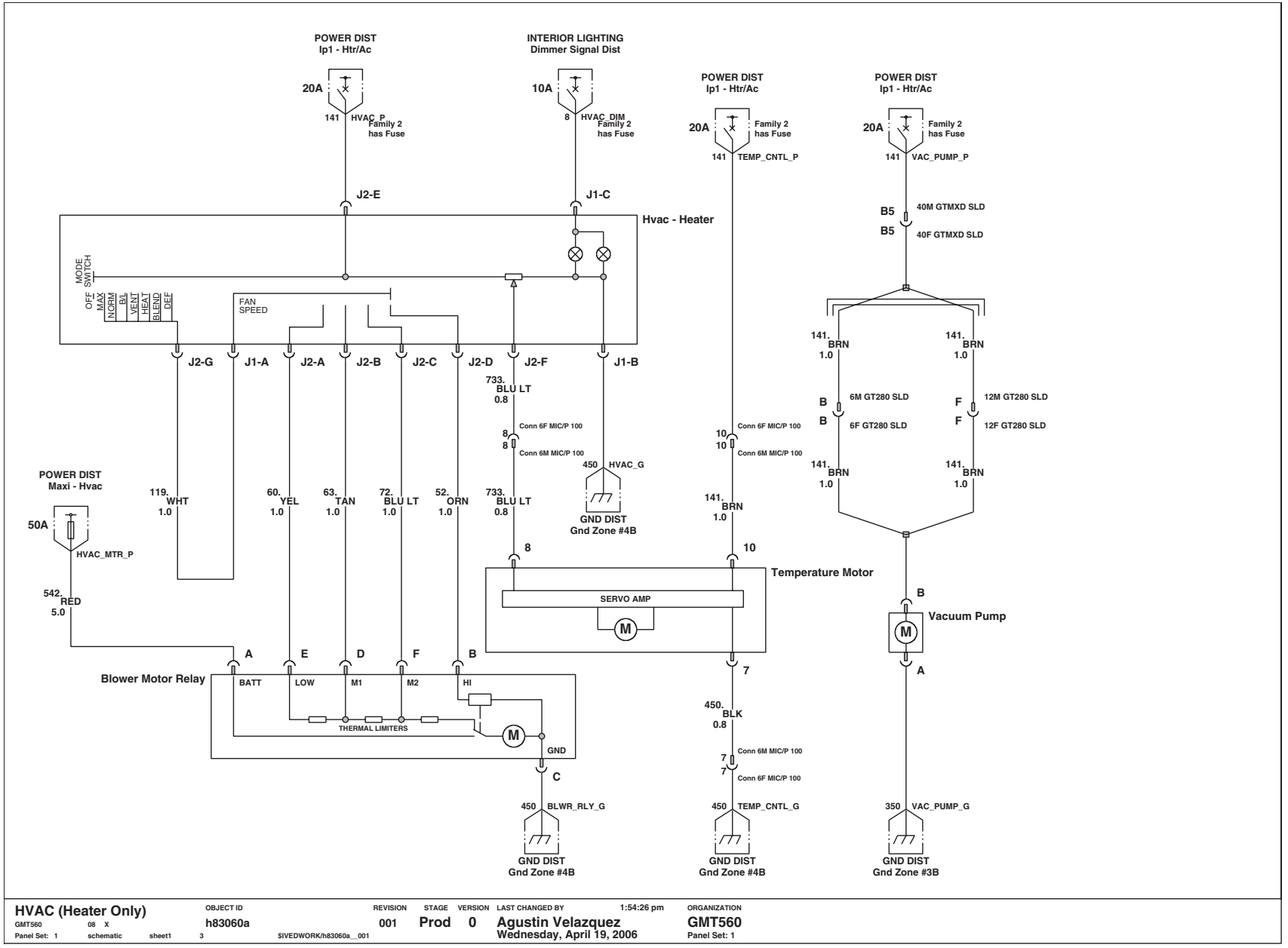


J1939 - (L18) 8.1L V8 GMPT VORTEC® - Gas – (LF8) 7.8L L6 Isuzu 6H - Diesel – (LF6) 7.2L L6 Caterpillar® C7 - Diesel (continued)



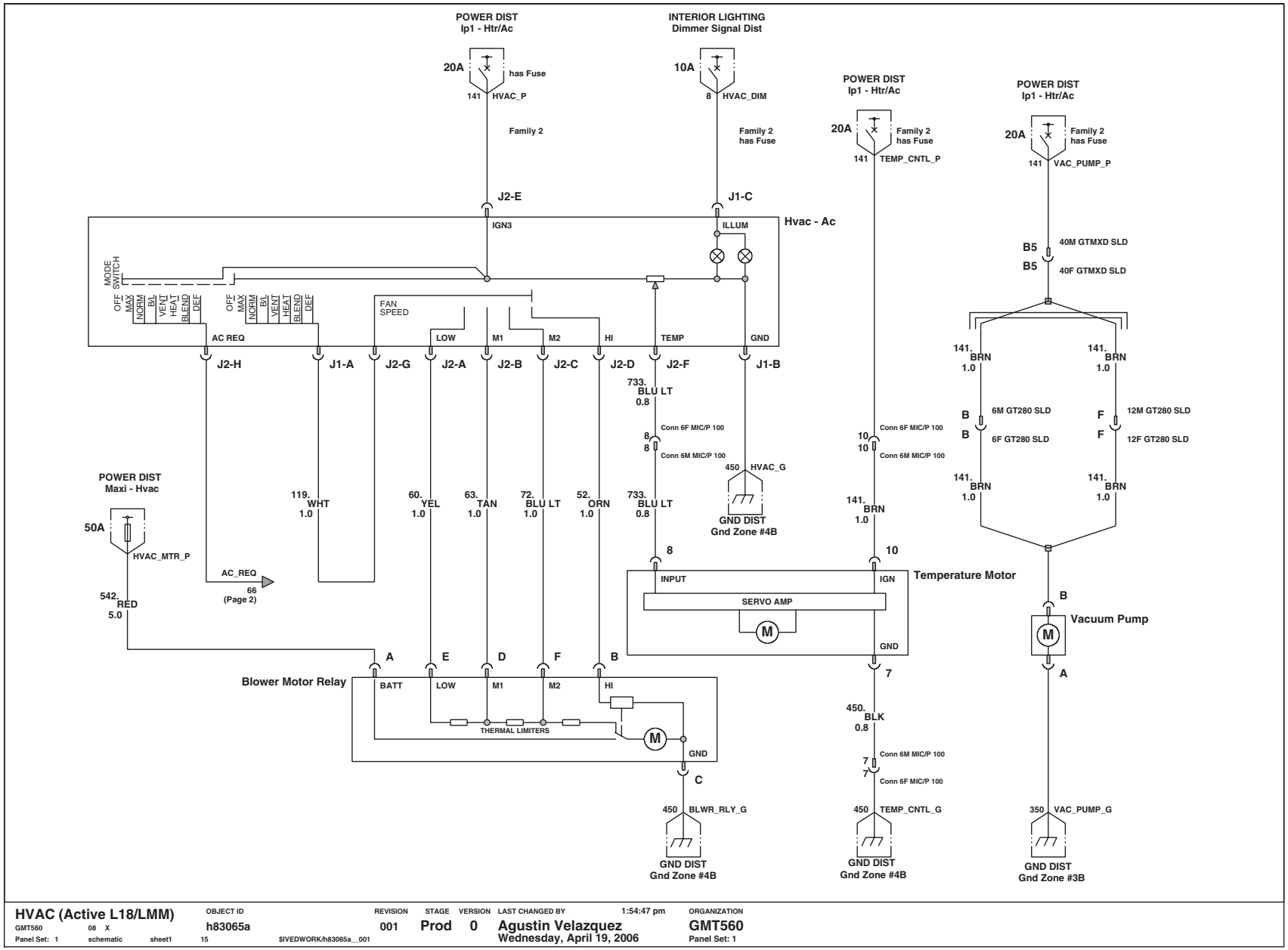
J1939 (I18/Lf8/Lf6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	ORGANIZATION
GMT560 08 X	h83057a	001	X	0	Agustin Velazquez	GMT560
Panel Set: 7 schematic sheet1 3	$IVEDWORK/h83057a__001				Wednesday, April 19, 2006 1:53:40 pm	Panel Set: 7

HVAC – Heater Only

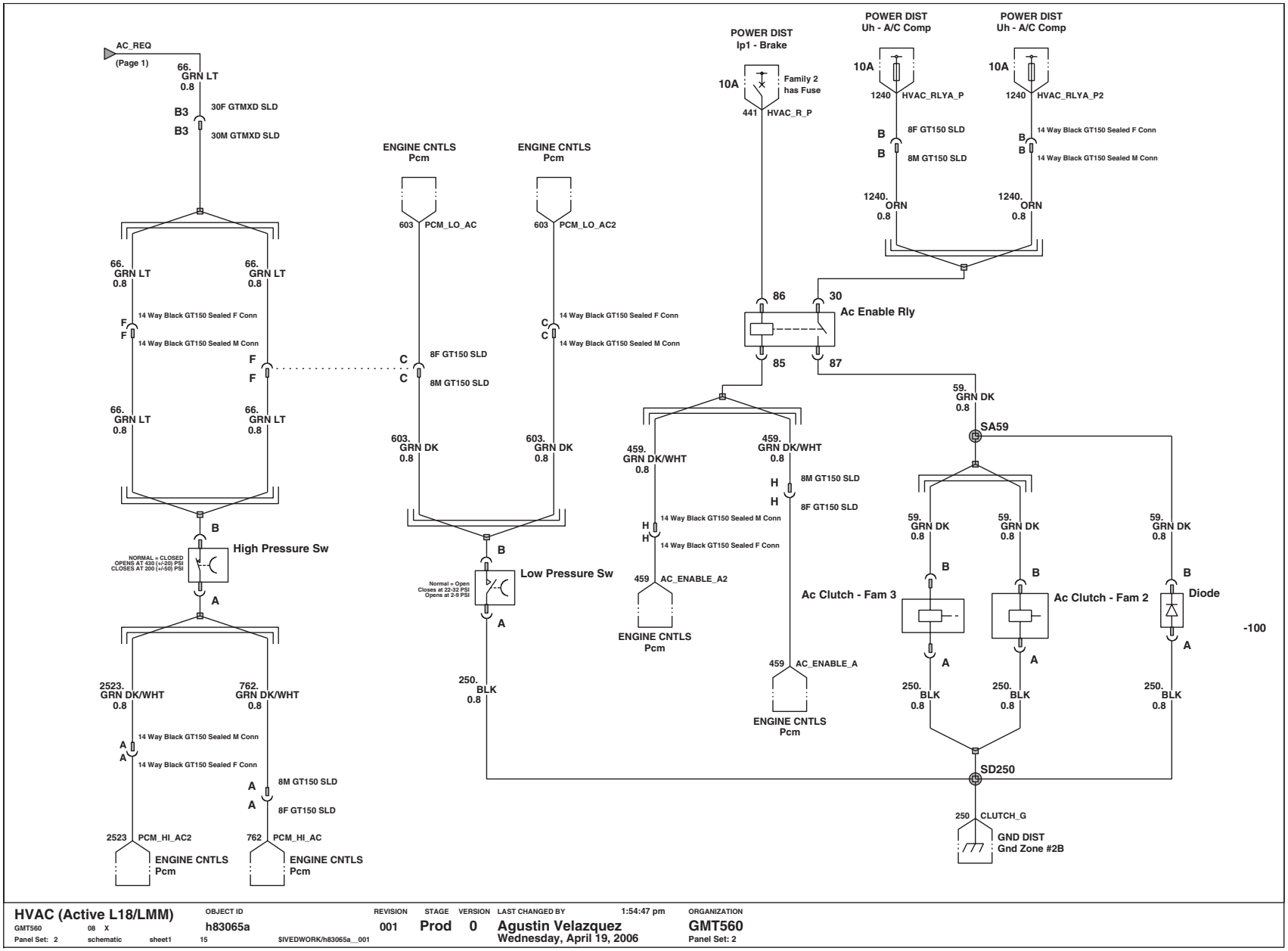


HVAC (Heater Only)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83060a	001	Prod	0	Agustin Velazquez	1:54:26 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83060a__001				Wednesday, April 19, 2006		Panel Set: 1

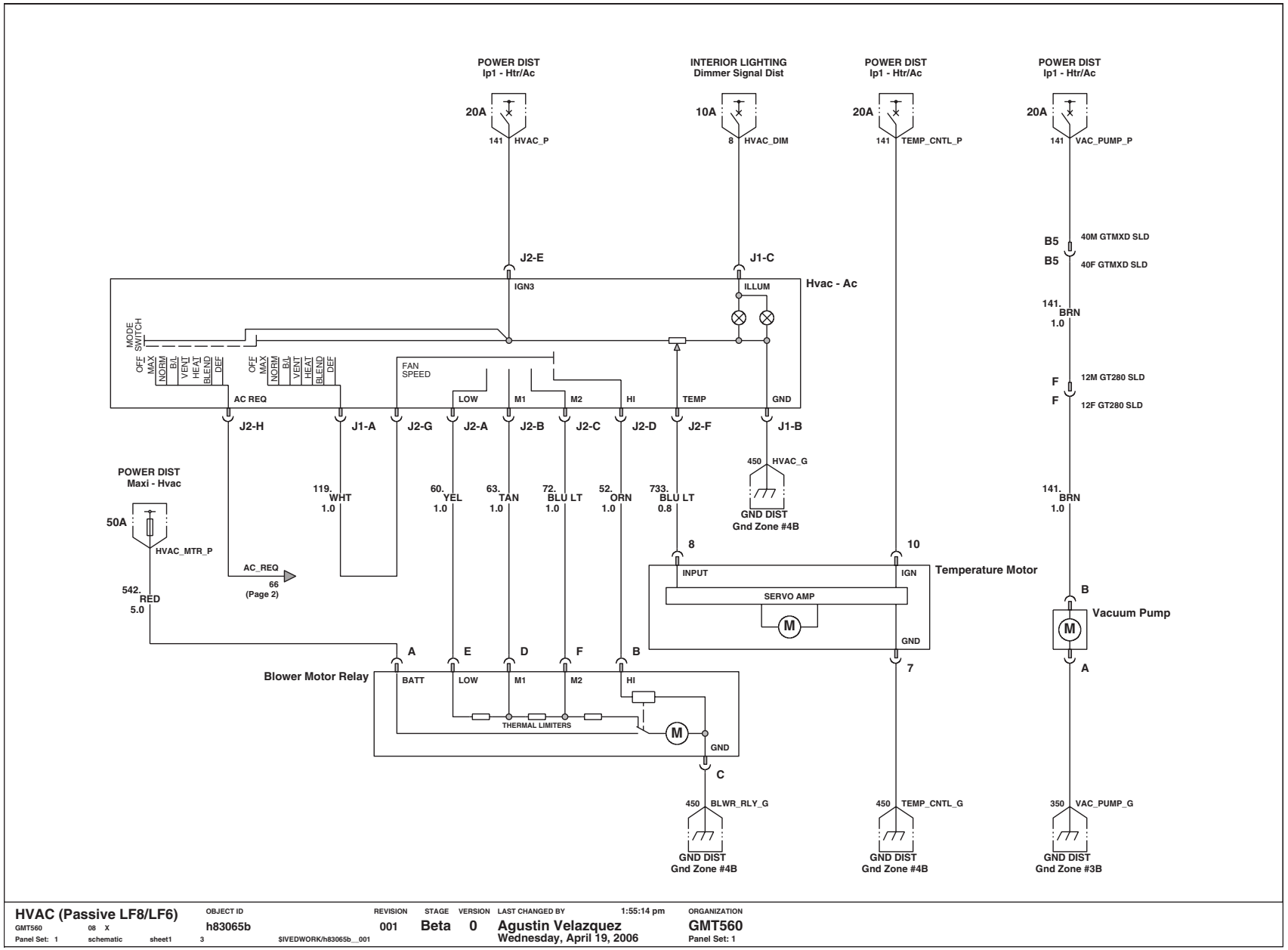
HVAC - Active (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel



HVAC - Active (LMM) 6.6L V8 Isuzu DURAMAX® - Diesel (continued)

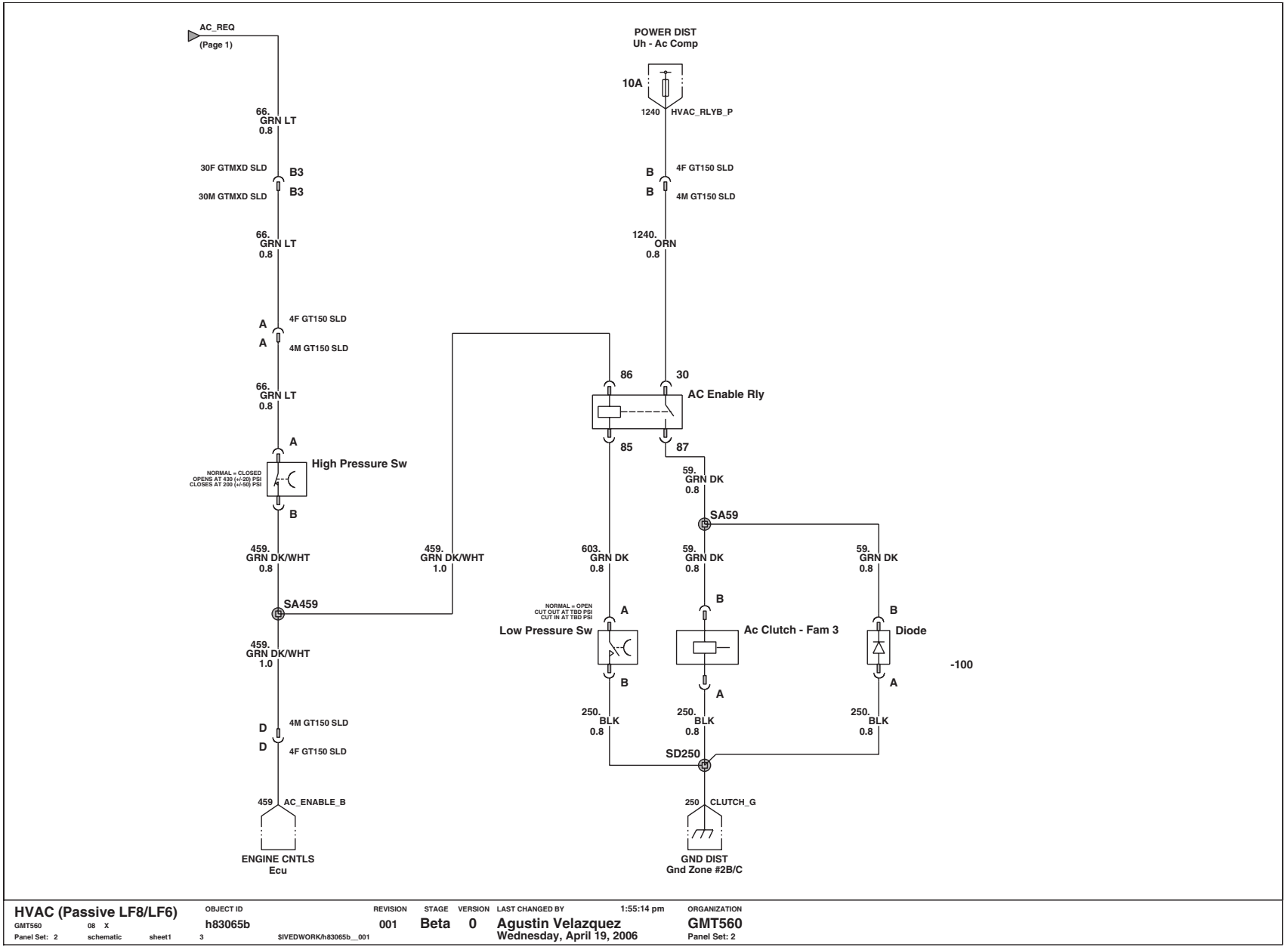


HVAC – Passive (LF8) 7.8L L6 Isuzu 6H - Diesel



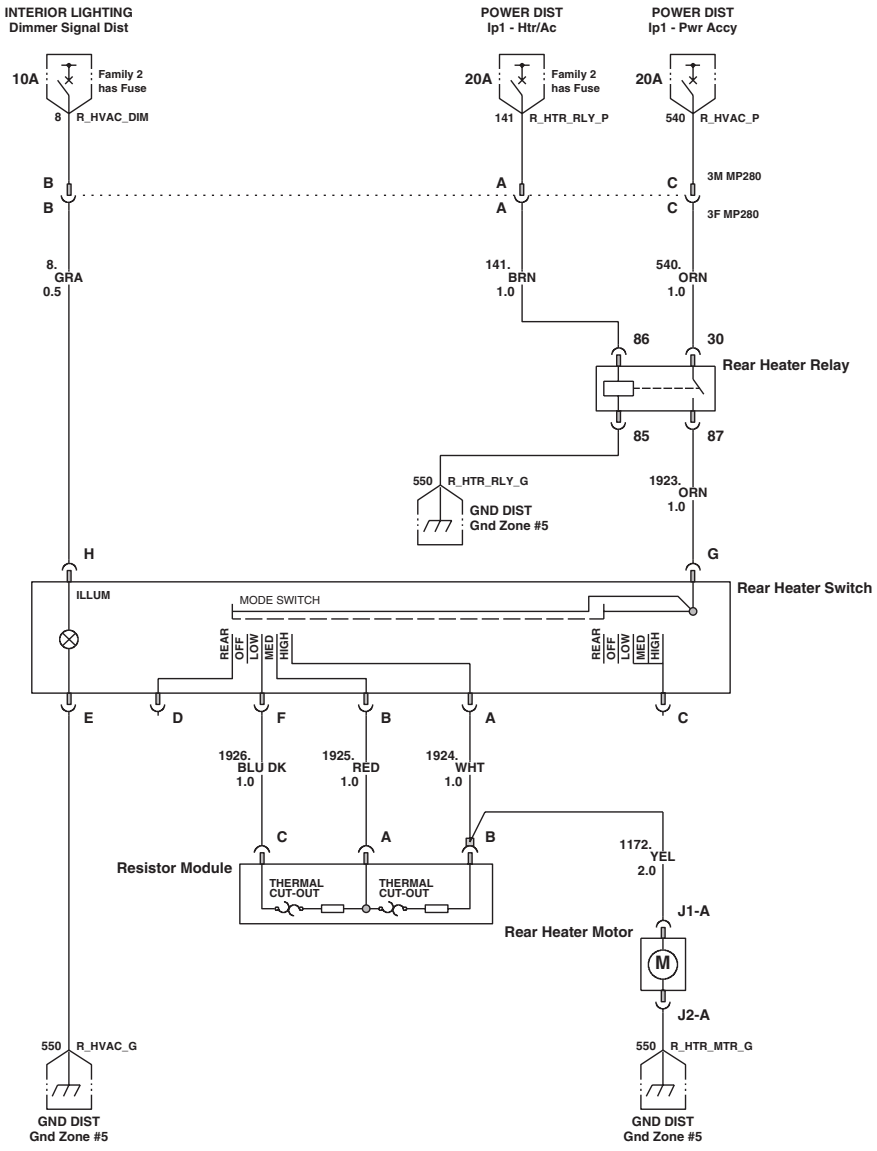
HVAC (Passive LF8/LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83065b	001	Beta	0	Agustin Velazquez	1:55:14 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83065b__001				Wednesday, April 19, 2006		Panel Set: 1

HVAC – Passive (LF8) 7.8L L6 Isuzu 6H - Diesel



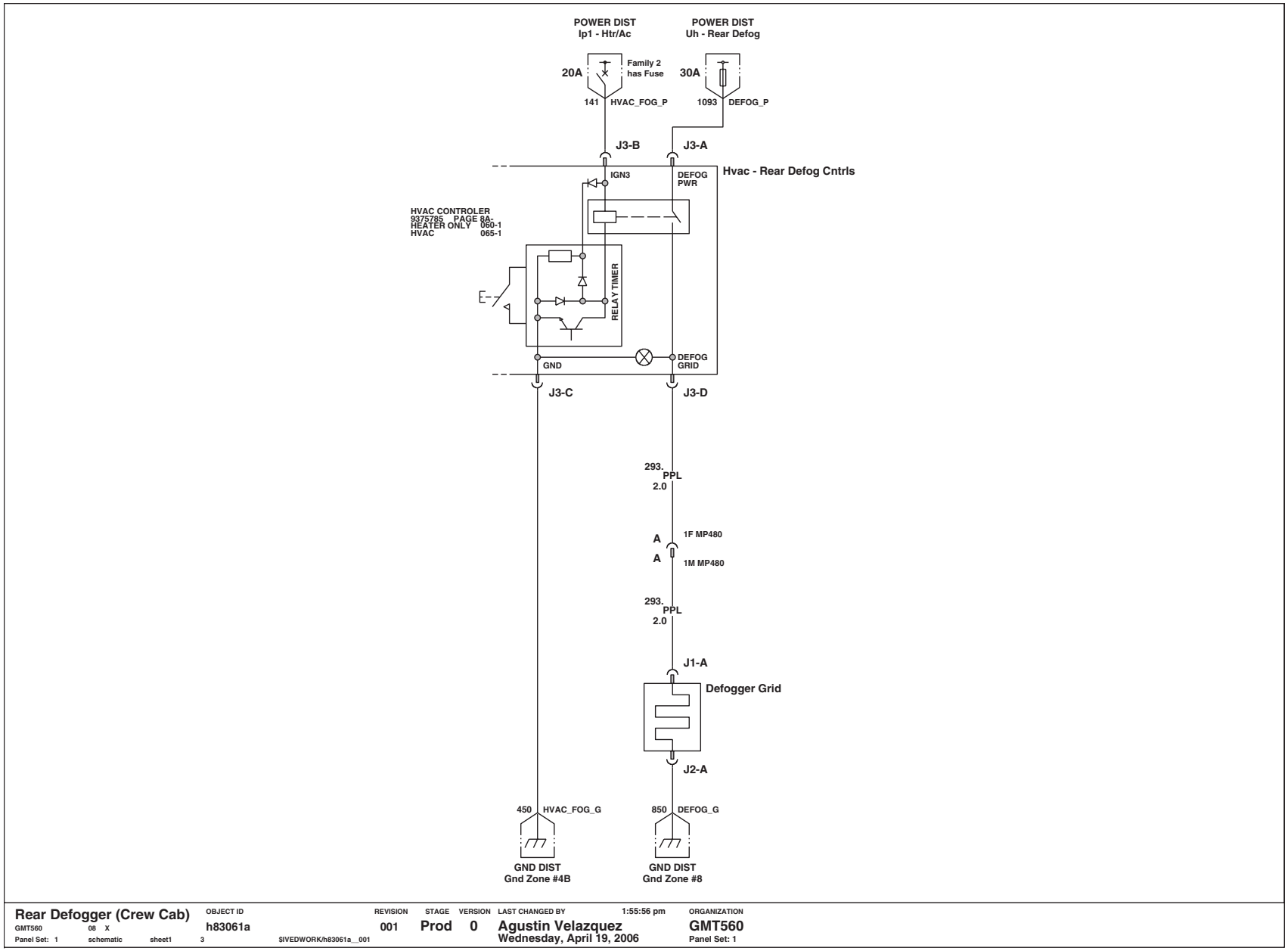
HVAC (Passive LF8/LF6)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83065b	001	Beta	0	Agustin Velazquez	1:55:14 pm	GMT560
Panel Set: 2 schematic sheet1 3	$IVEDWORK/h83065b__001				Wednesday, April 19, 2006		Panel Set: 2

Rear Heater – Crew Cab



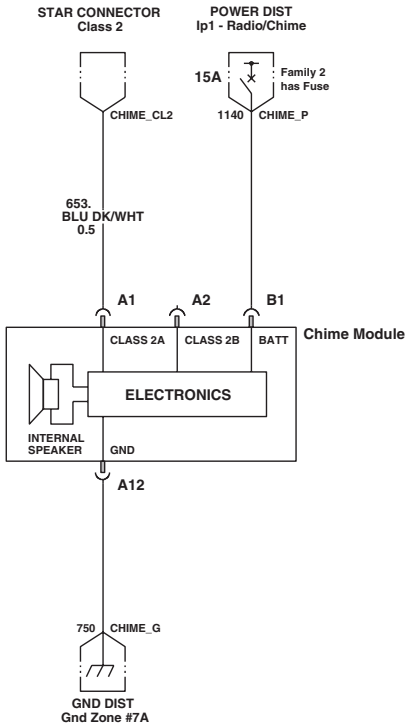
Rear Heater (Crew Cab)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83066a	001	Prod	0	Agustin Velazquez	1:55:33 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83066a__001				Wednesday, April 19, 2006		Panel Set: 1

Rear Defogger – Crew Cab



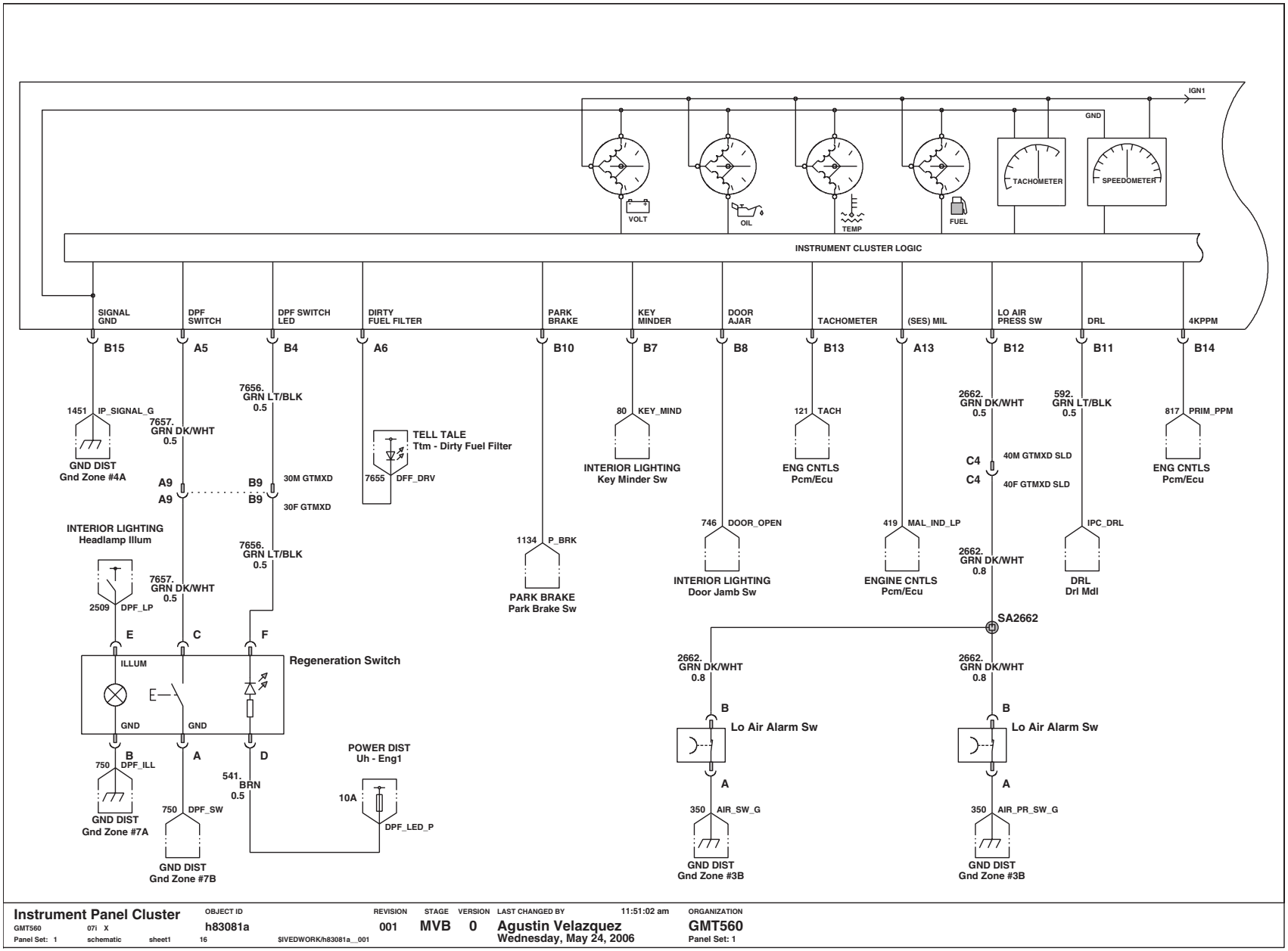
Rear Defogger (Crew Cab)	OBJECT ID		REVISION	STAGE	VERSION	LAST CHANGED BY	1:55:56 pm	ORGANIZATION
GMT560 08 X	**h83061a**		**001**	**Prod**	**0**	**Agustin Velazquez**		**GMT560**
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83061a__001					**Wednesday, April 19, 2006**		Panel Set: 1

Chime

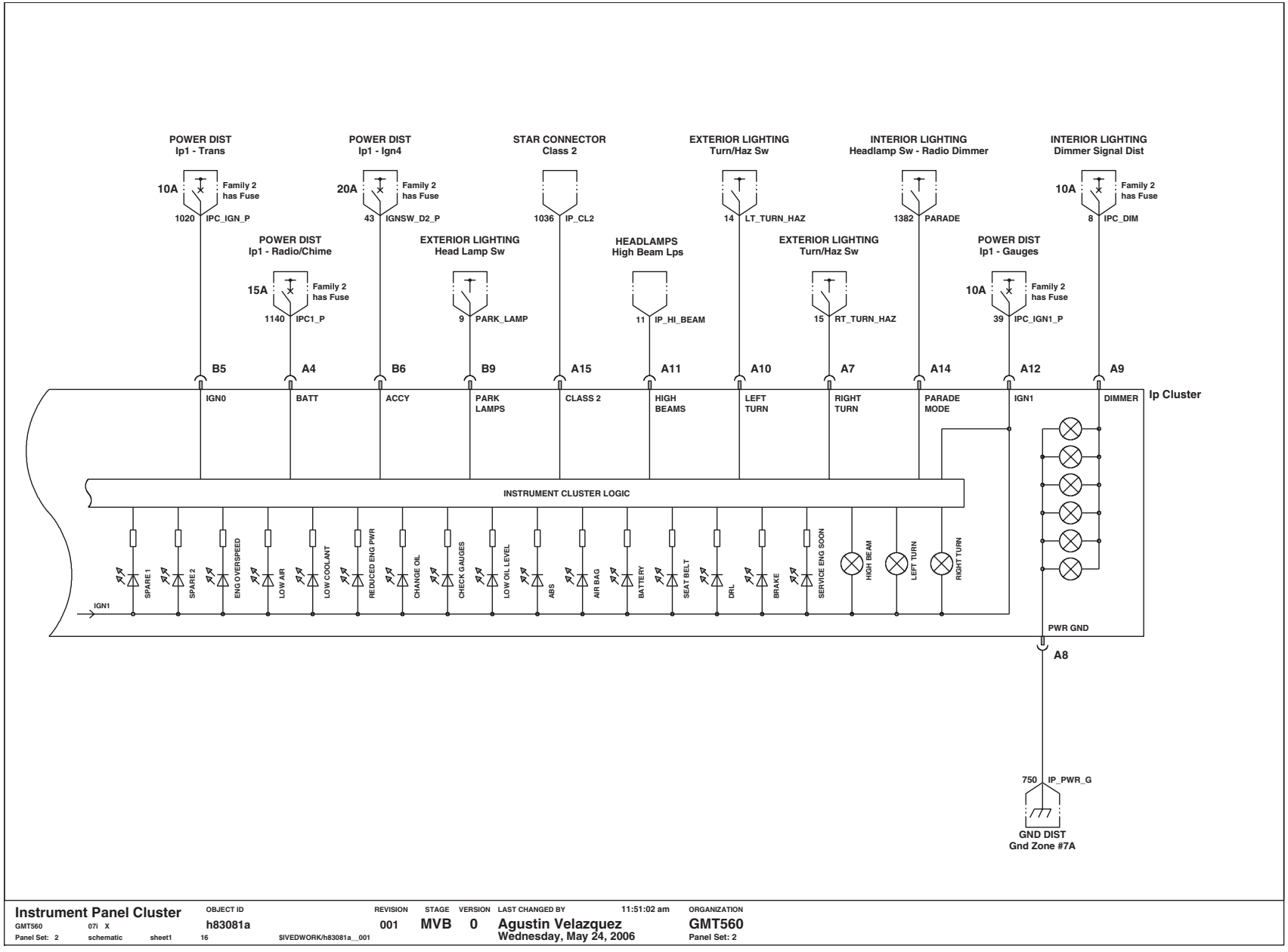


Chime		OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	1:56:14 pm	ORGANIZATION
GMT560	08 X	h83076a	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 1	schematic sheet1 2	$IVEDWORK/h83076a__001				Wednesday, April 19, 2006		Panel Set: 1

Displays - Instrument Panel Cluster (IPC)

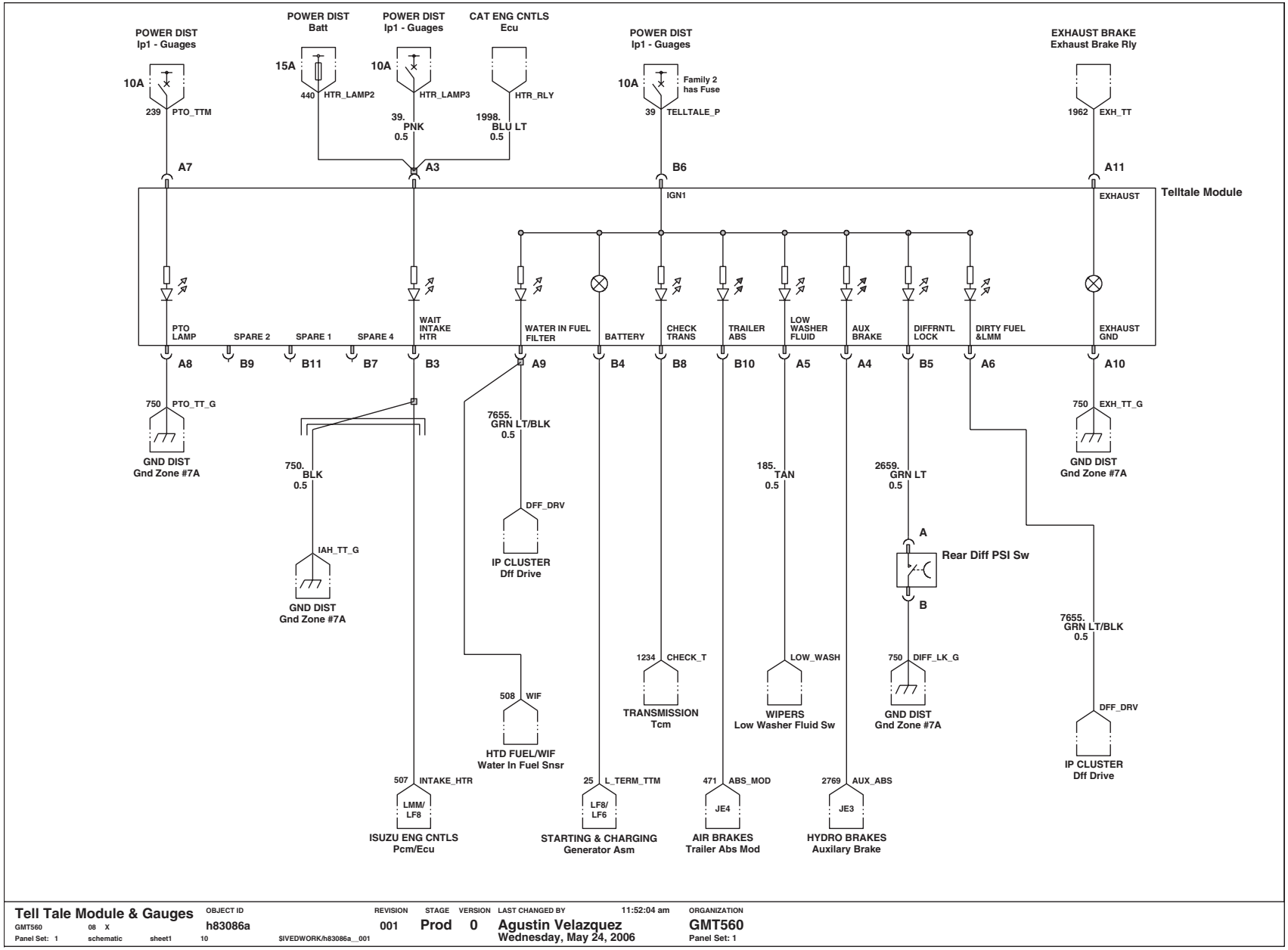


Displays - Instrument Panel Cluster (IPC) (continued)



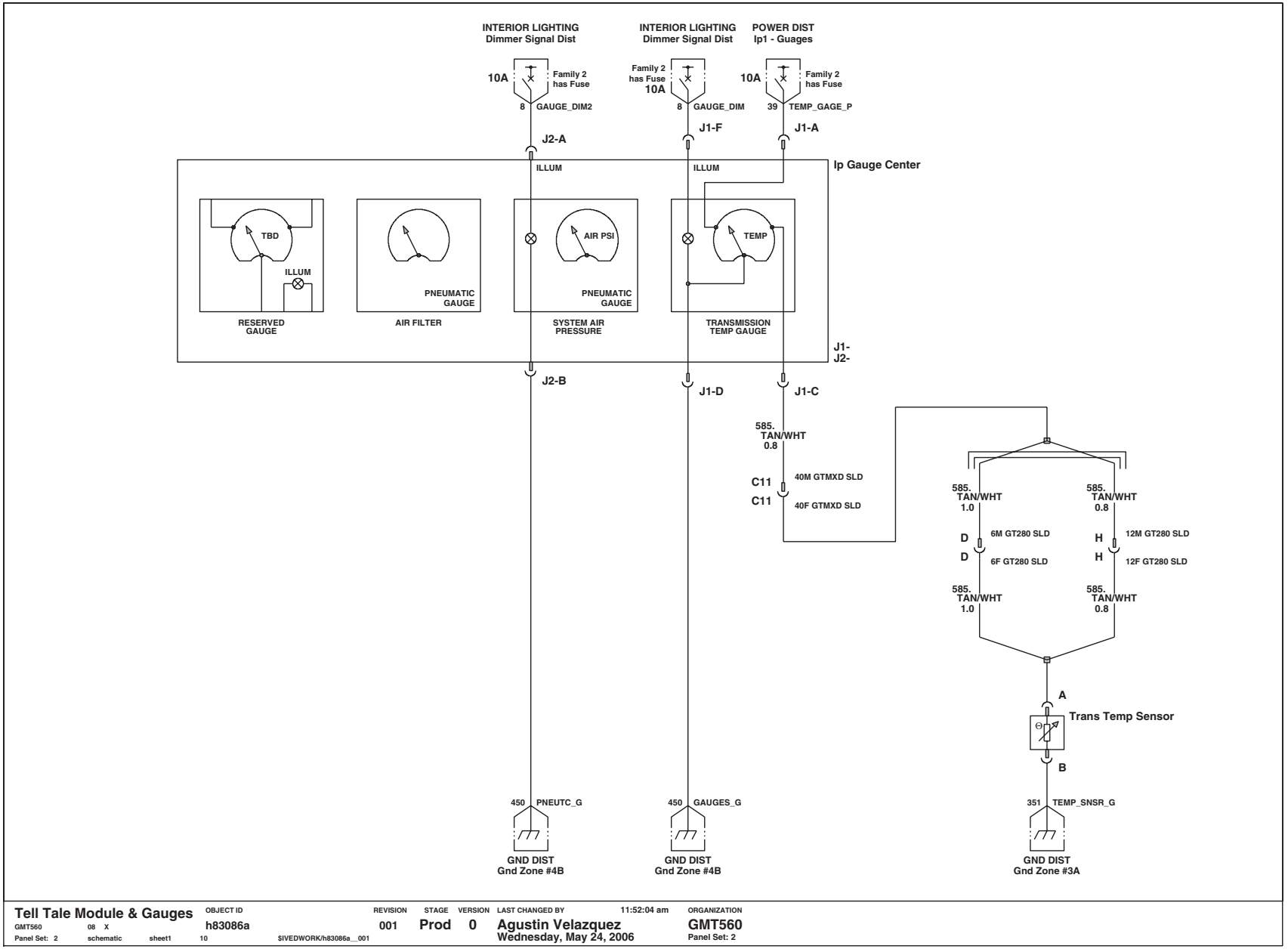
Instrument Panel Cluster	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 07i X	h83081a	001	MVB	0	Agustin Velazquez	11:51:02 am	GMT560
Panel Set: 2 schematic sheet1 16	$IVEDWORK/h83081a__001				Wednesday, May 24, 2006		Panel Set: 2

Displays - Tell Tale Module & Gauges



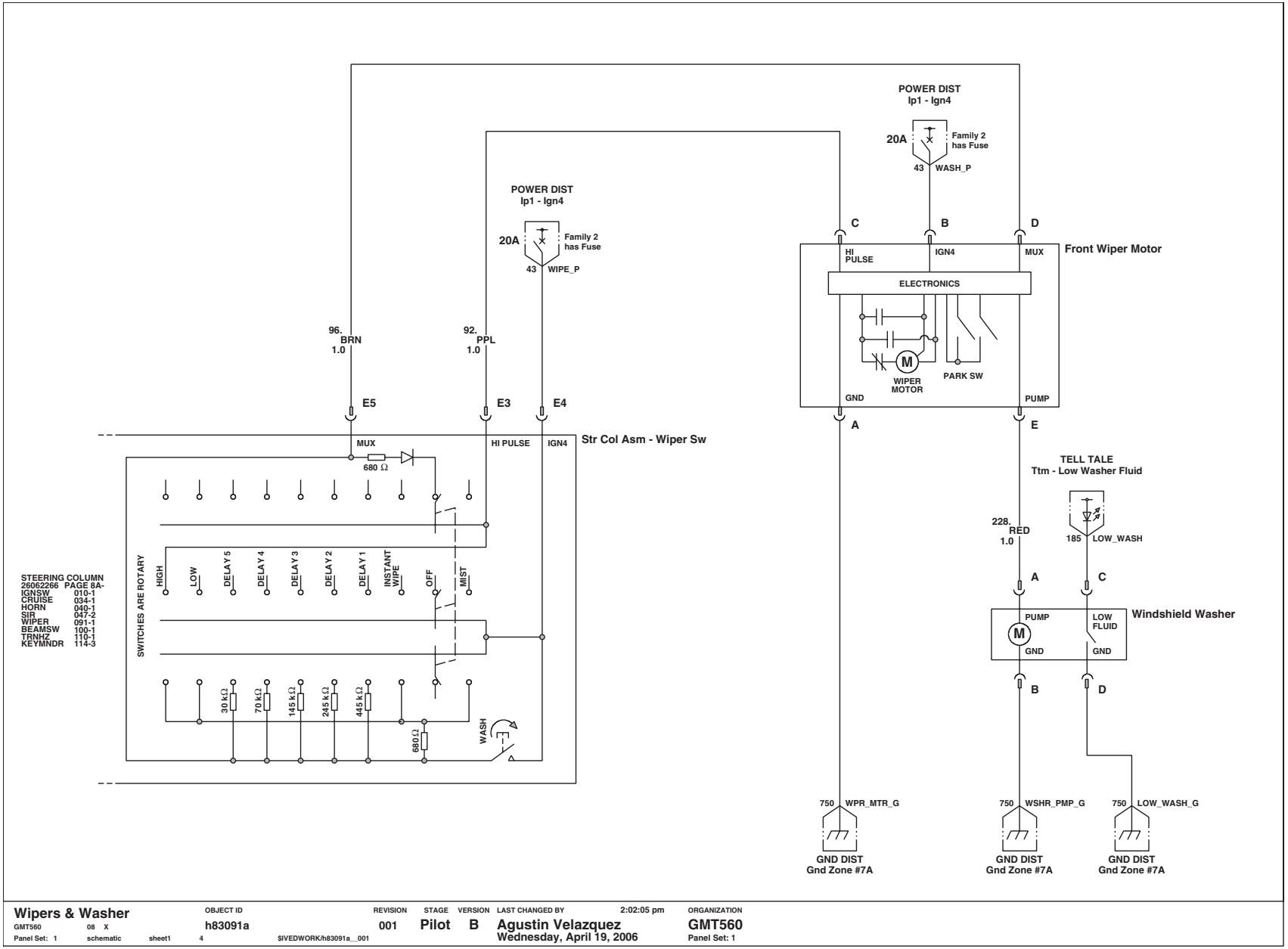
Tell Tale Module & Gauges	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83086a	001	Prod	0	Agustin Velazquez	11:52:04 am	GMT560
Panel Set: 1 schematic sheet1 10	$IVEDWORK/h83086a__001				Wednesday, May 24, 2006		Panel Set: 1

Displays - Tell Tale Module & Gauges (continued)



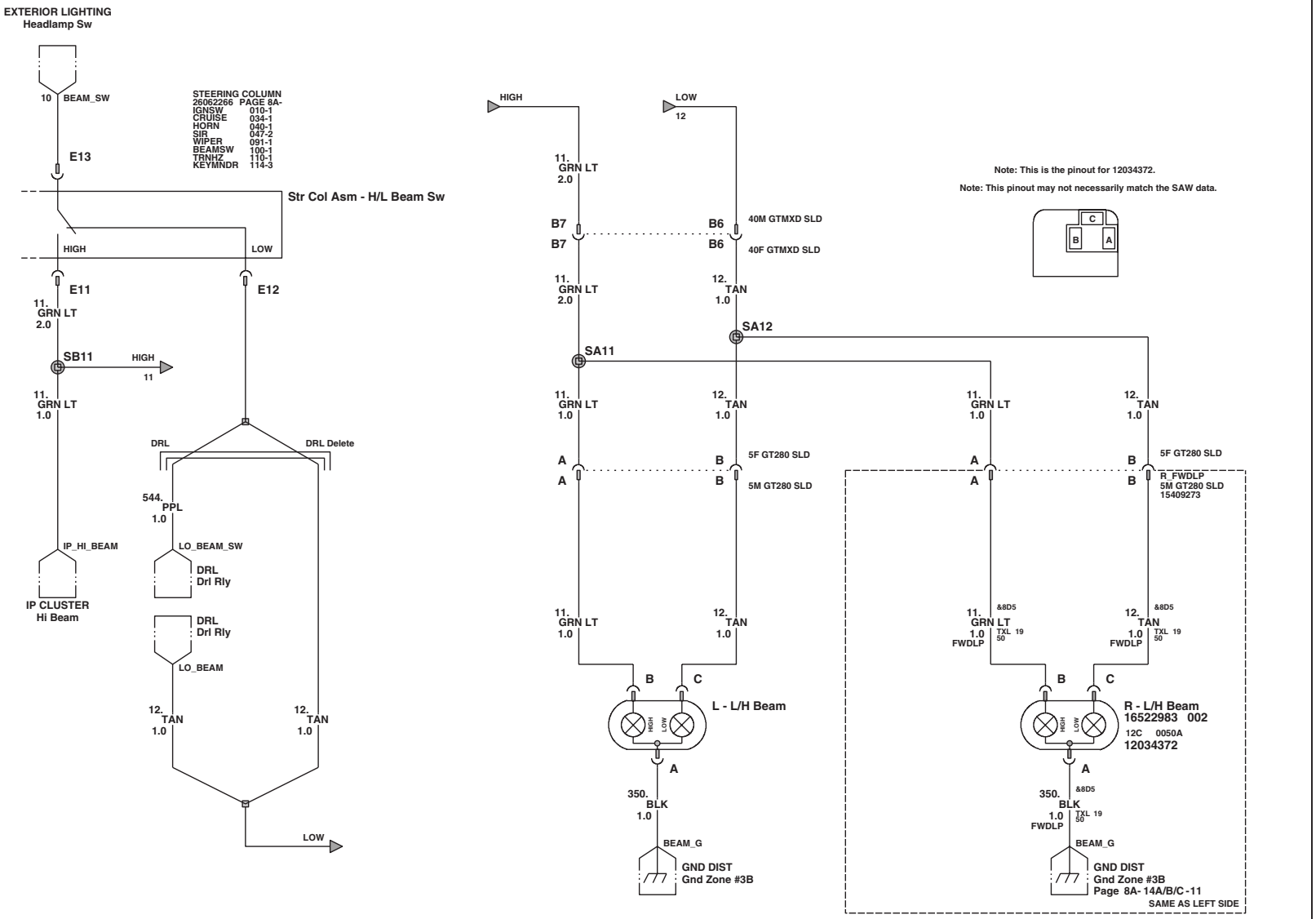
Tell Tale Module & Gauges	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	11:52:04 am	ORGANIZATION
GMT560 08 X	h83086a	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 2 schematic sheet1 10	$IVEDWORK/h83086a__001				Wednesday, May 24, 2006		Panel Set: 2

Windshield Wiper/Washer



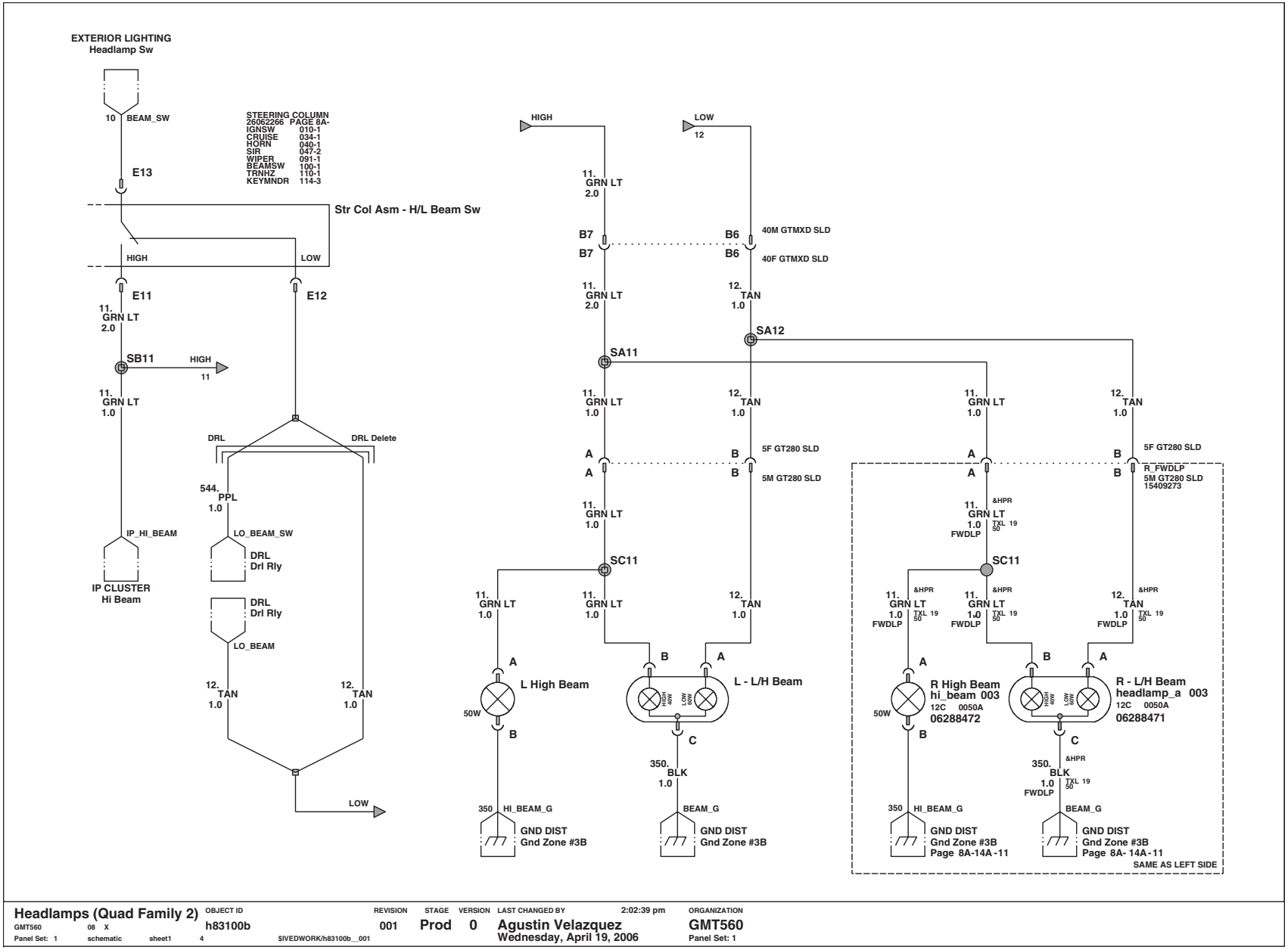
Wipers & Washer	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83091a	001	Pilot	B	Agustin Velazquez	2:02:05 pm	GMT560
Panel Set: 1 schematic sheet1 4 $IVEDWORK/h83091a__001					Wednesday, April 19, 2006		Panel Set: 1

Headlamps – Dual

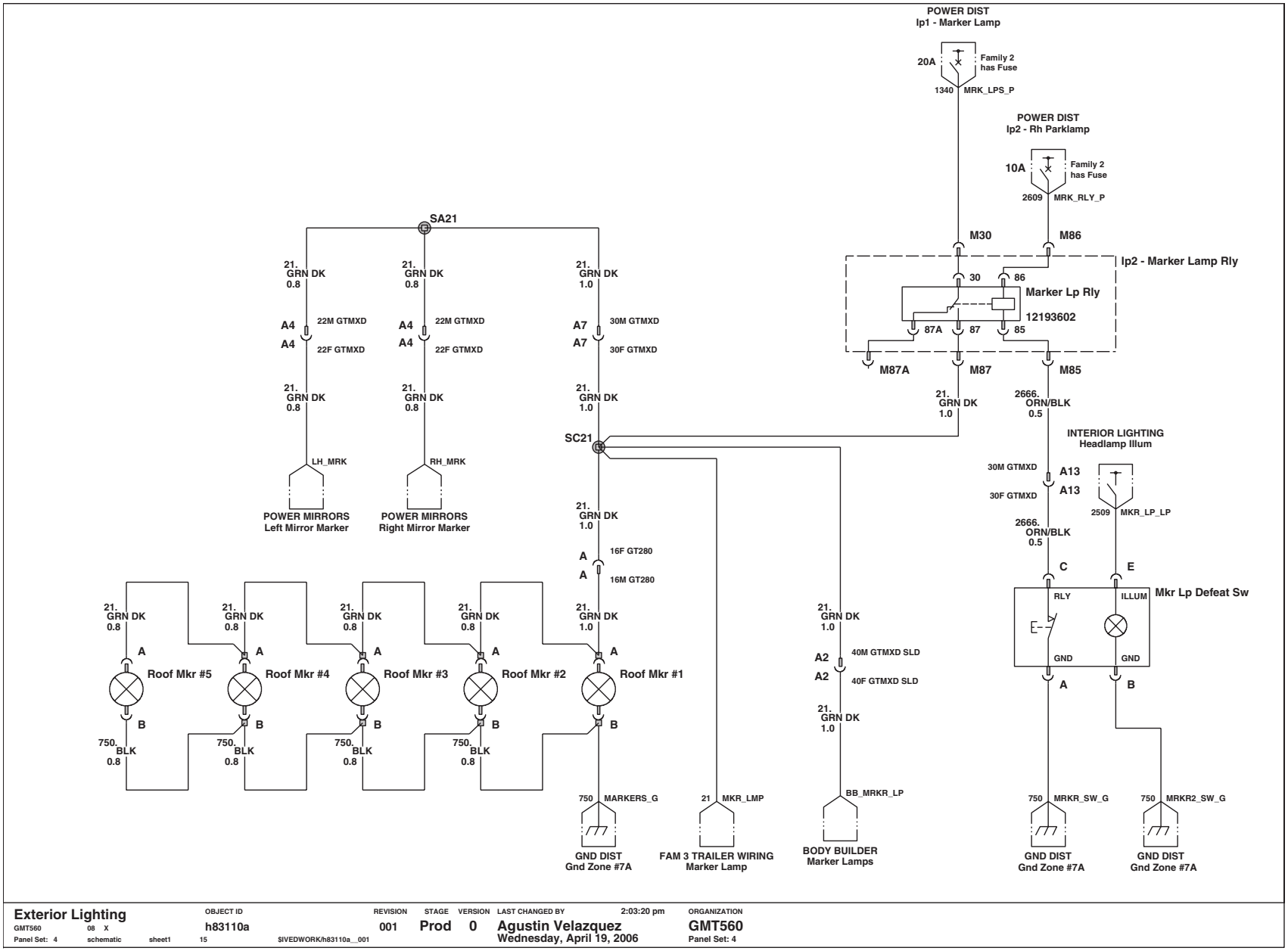


Headlamps (Dual)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	2:02:20 pm	ORGANIZATION
GMT560 08 X	h83100a	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 4	$IVEDWORK/h83100a__001				Wednesday, April 19, 2006		Panel Set: 1

Headlamps – Quad (Family 2)



Daytime Running Lamps (DRL)

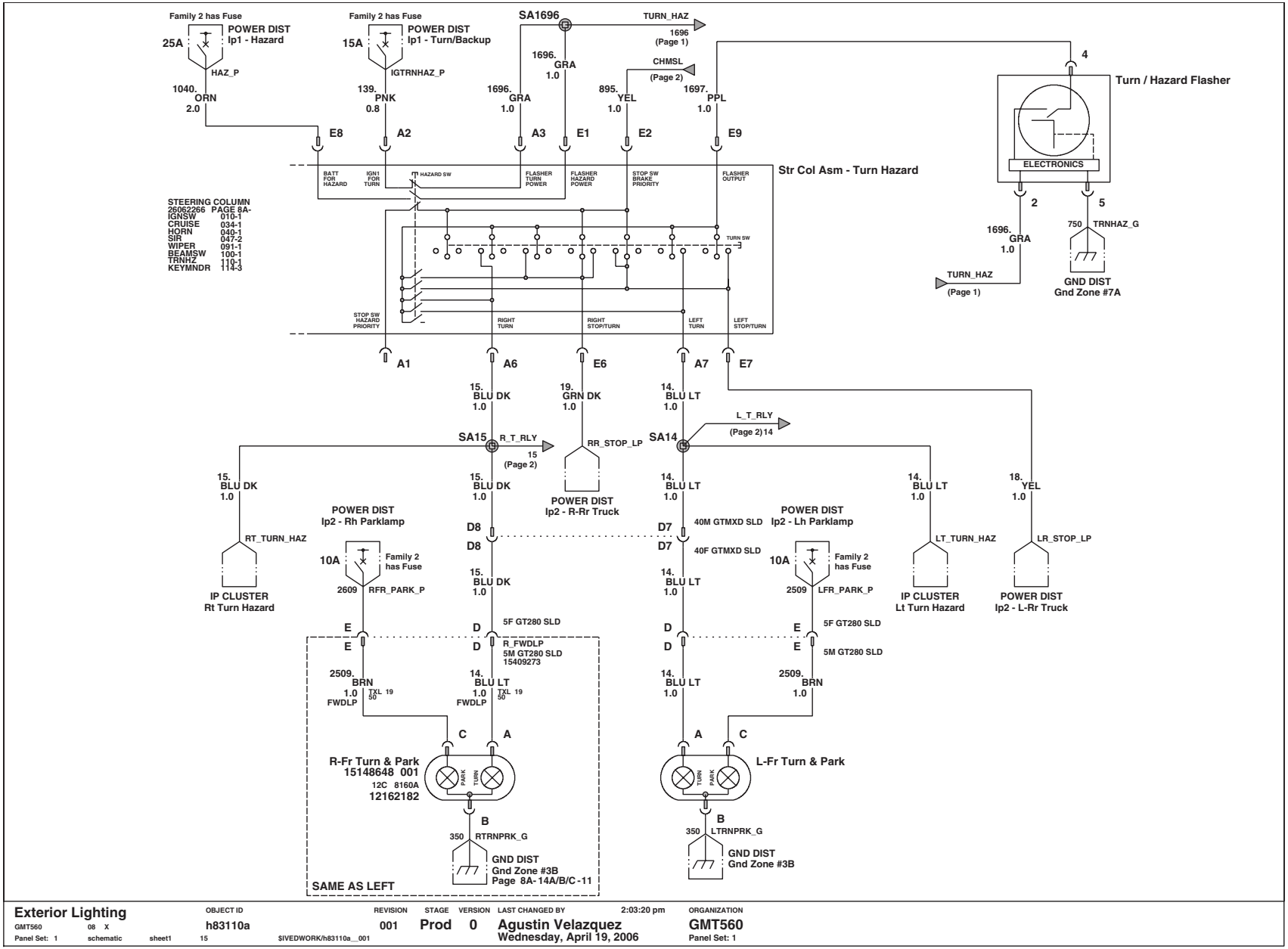


Exterior Lighting

OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
h83110a	001	Prod	0	Agustin Velazquez	2:03:20 pm Wednesday, April 19, 2006	GMT560

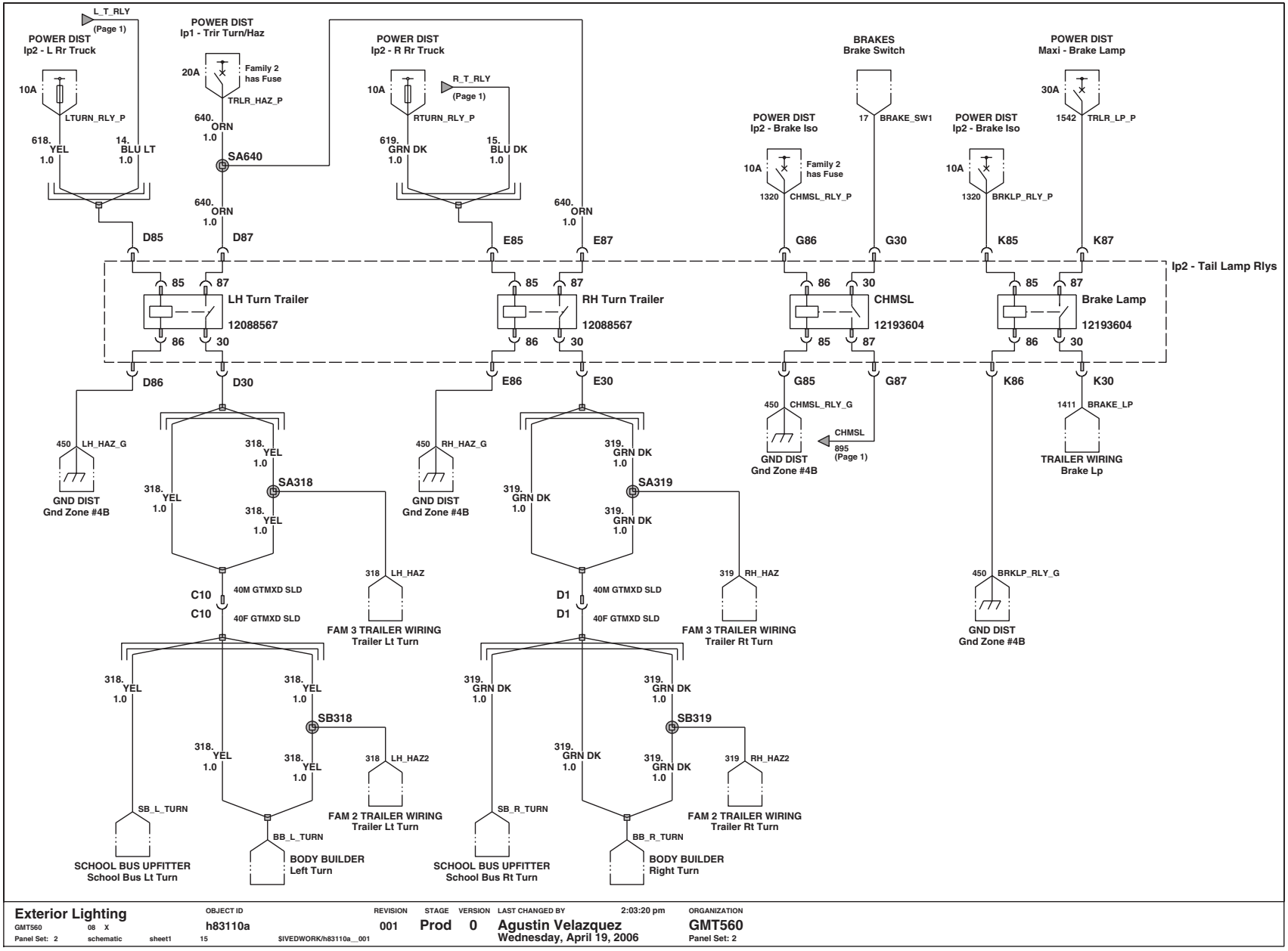
GMT560 08 X
Panel Set: 4 schematic sheet1 15 SIVEDWORK/h83110a__001
Panel Set: 4

Exterior Lighting

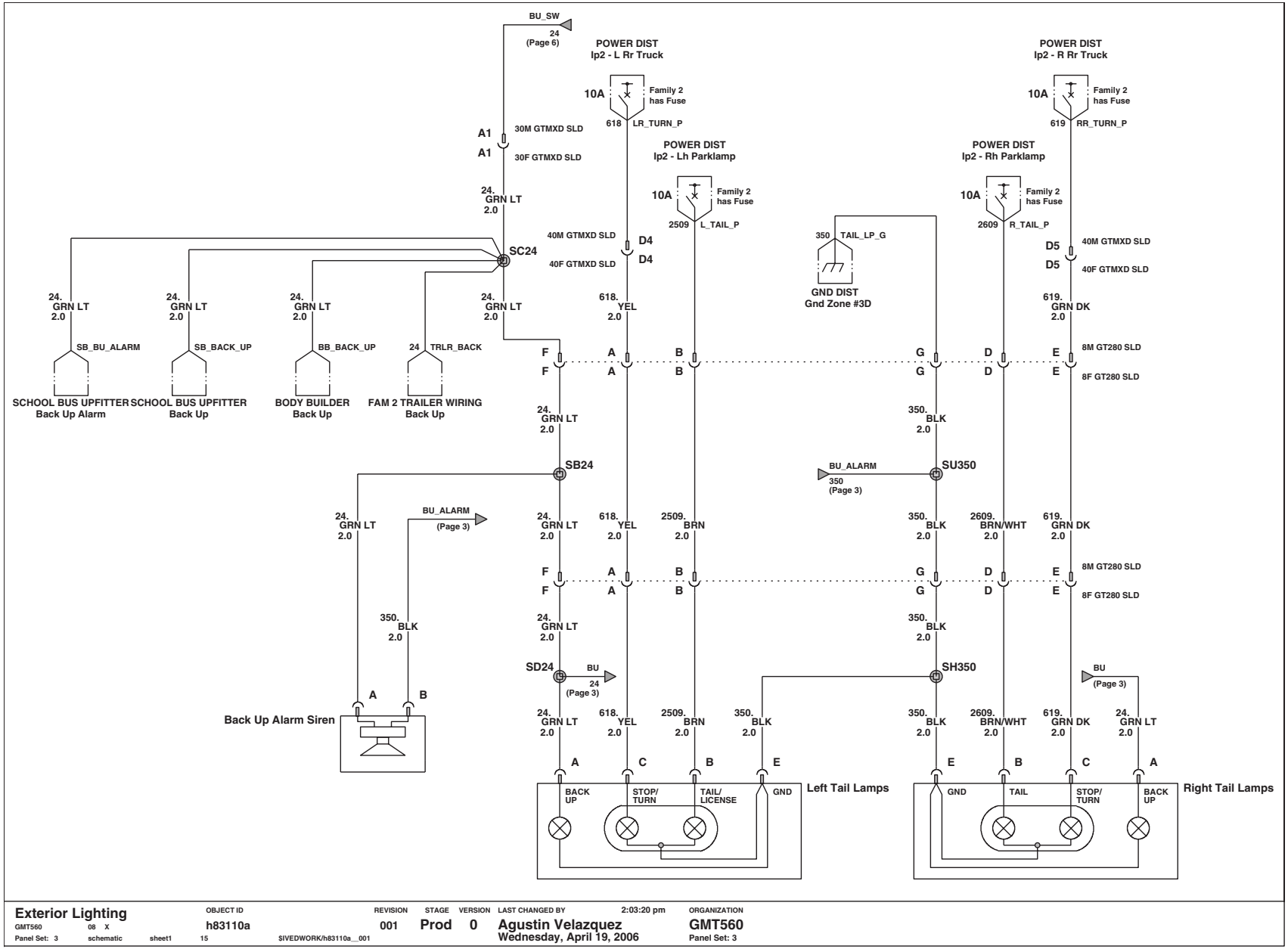


Exterior Lighting	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83110a	001	Prod	0	Agustin Velazquez	2:03:20 pm	GMT560
Panel Set: 1 schematic sheet1 15	$IVEDWORK/h83110a__001				Wednesday, April 19, 2006		Panel Set: 1

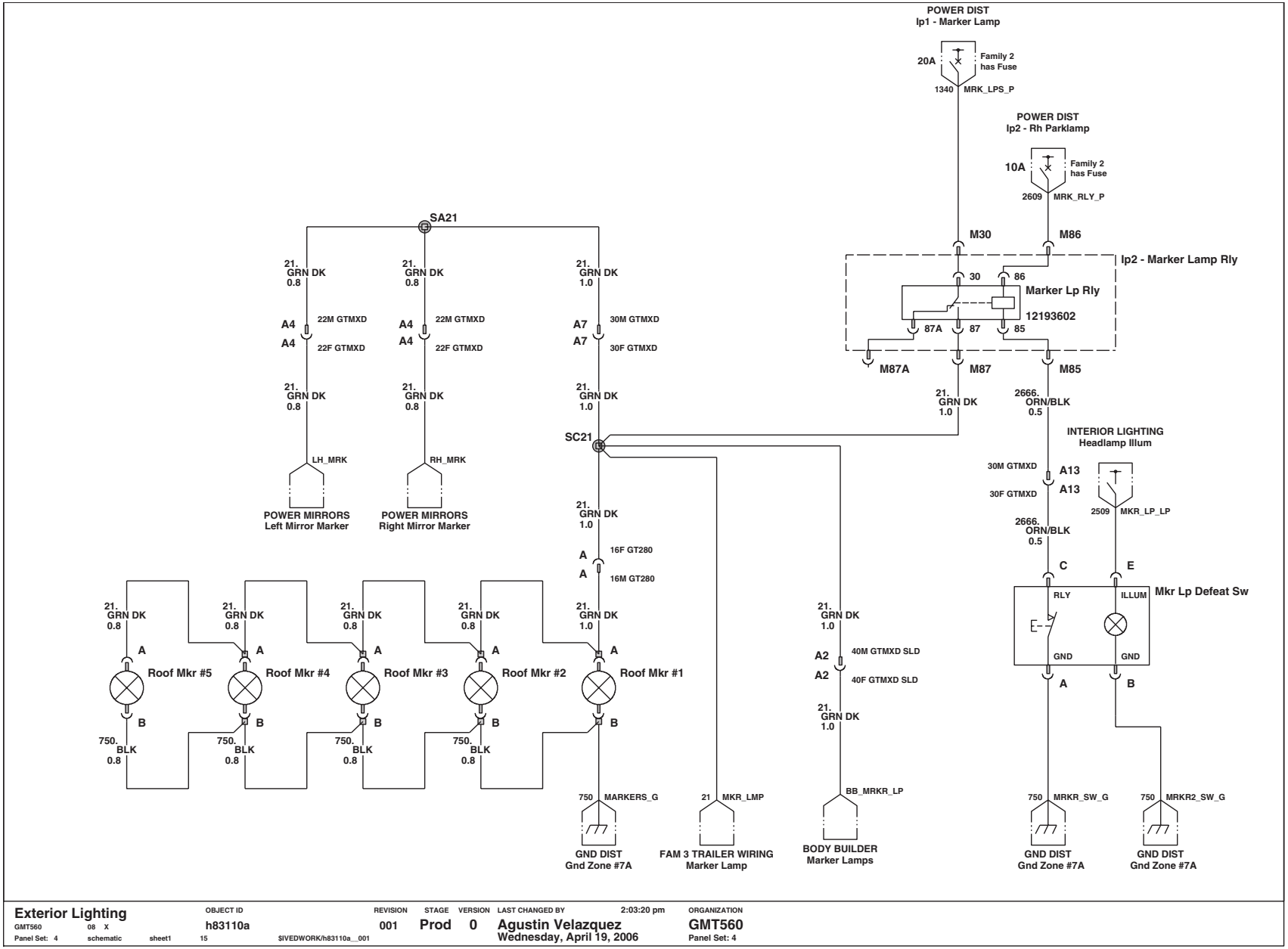
Exterior Lighting (continued)



Exterior Lighting (continued)

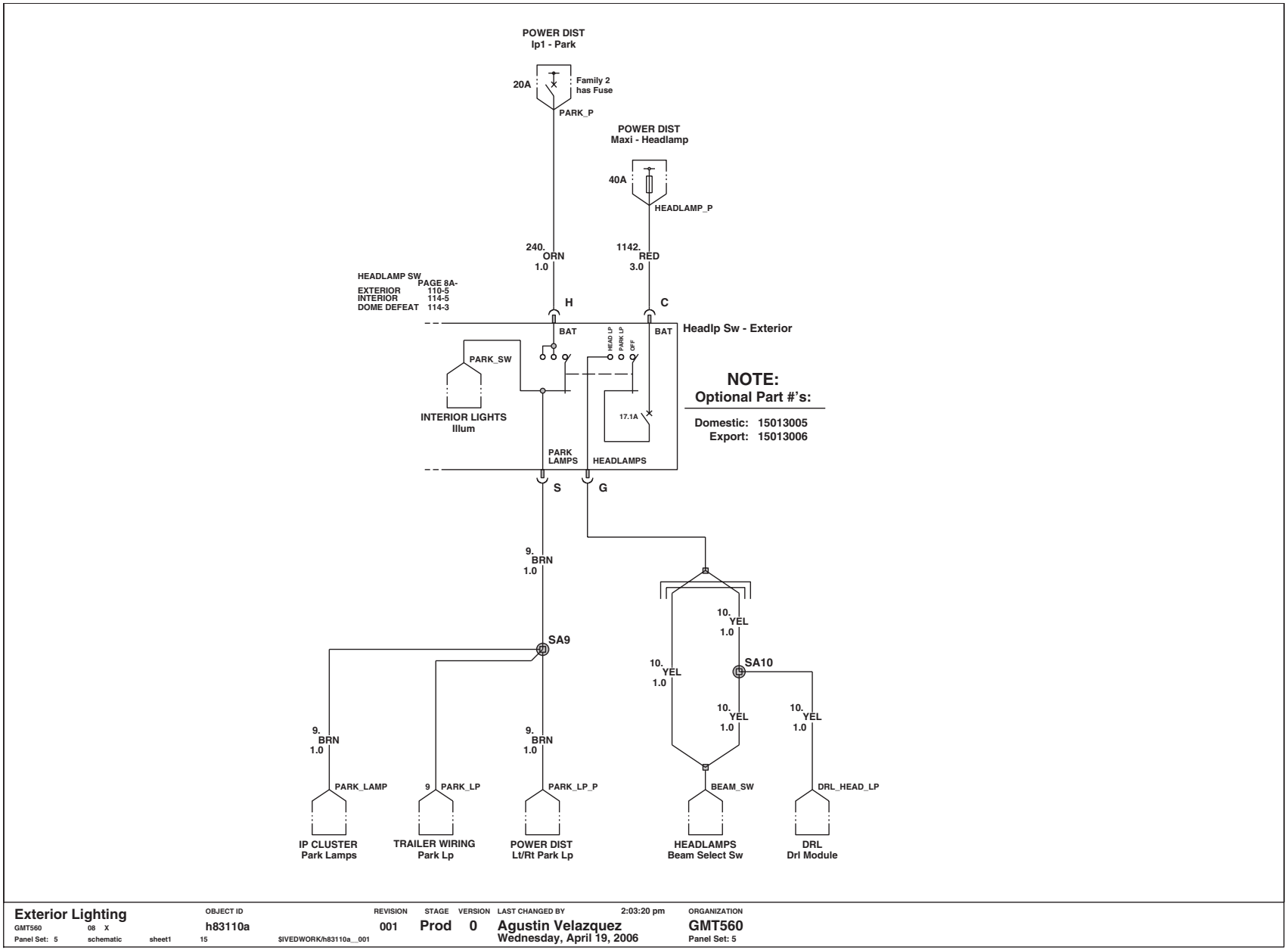


Exterior Lighting (continued)



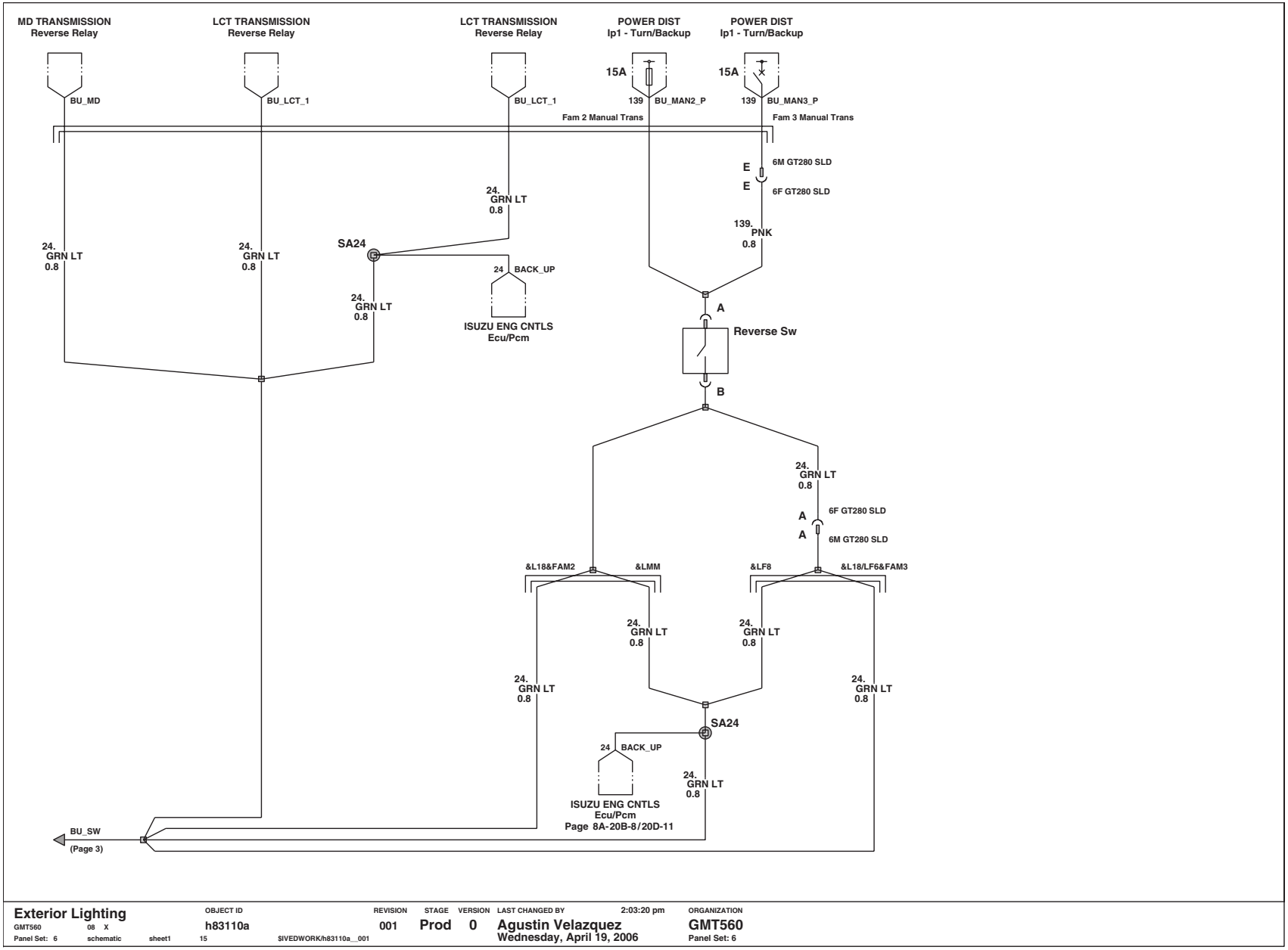
Exterior Lighting	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83110a	001	Prod	0	Agustin Velazquez	2:03:20 pm	GMT560
Panel Set: 4 schematic sheet1 15	$IVEDWORK/h83110a__001				Wednesday, April 19, 2006		Panel Set: 4

Exterior Lighting (continued)



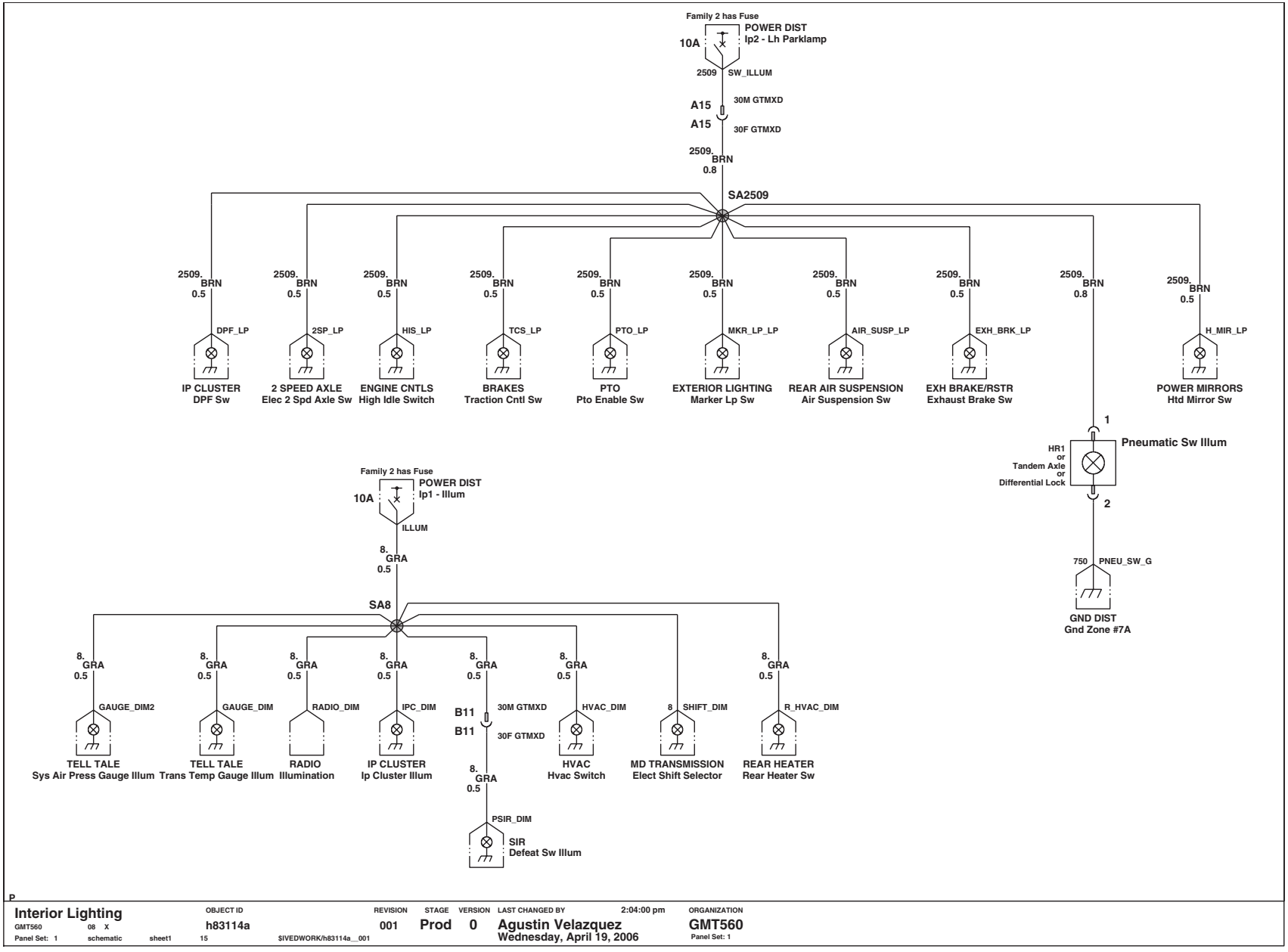
Exterior Lighting	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83110a	001	Prod	0	Agustin Velazquez	2:03:20 pm	GMT560
Panel Set: 5 schematic sheet1 15	$IVEDWORK/h83110a__001				Wednesday, April 19, 2006		Panel Set: 5

Exterior Lighting (continued)

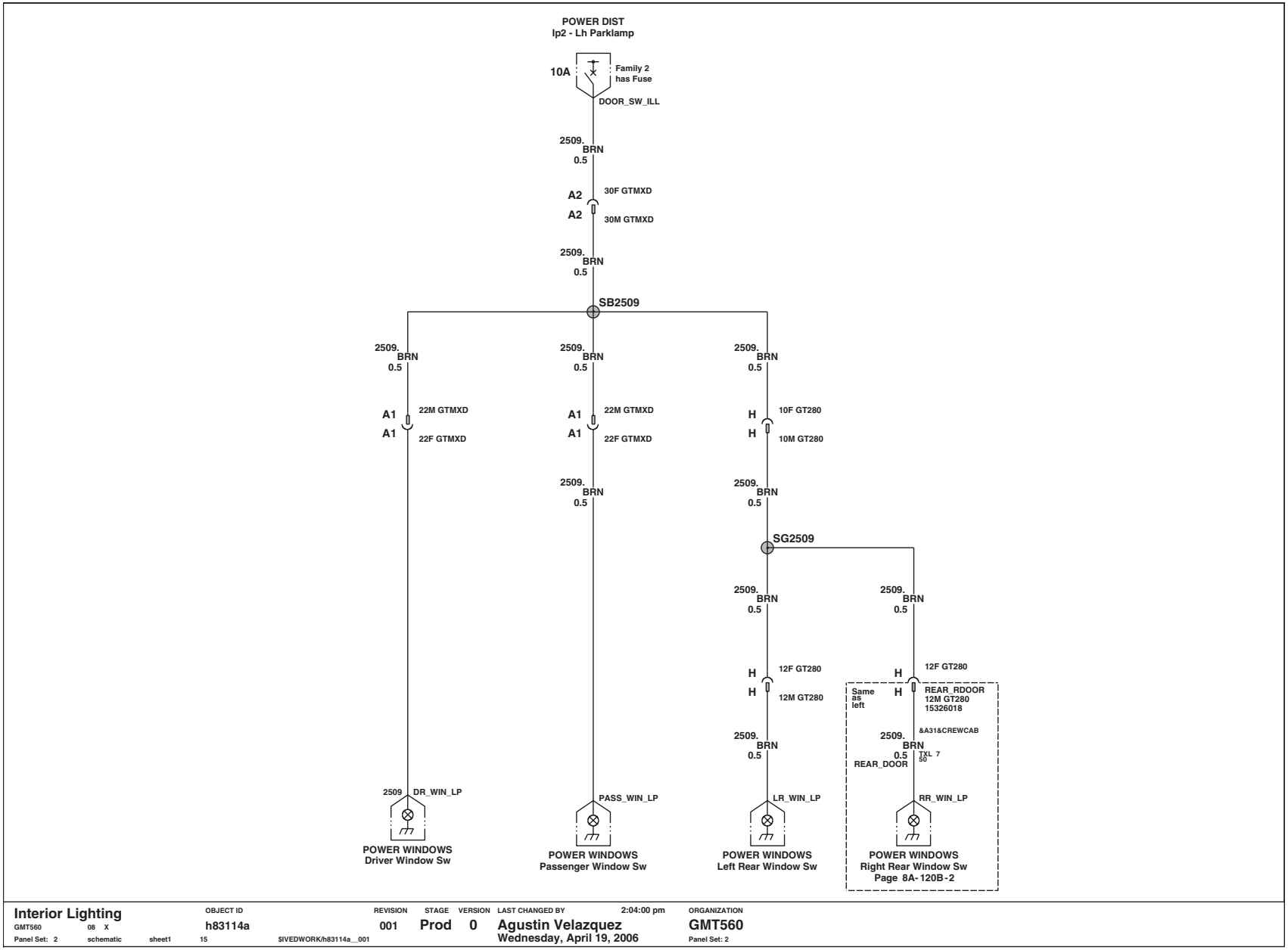


Exterior Lighting	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	2:03:20 pm	ORGANIZATION
GMT560 08 X	h83110a	001	Prod	0	Agustin Velazquez		GMT560
Panel Set: 6 schematic sheet1 15	\IVEDWORK/h83110a__001				Wednesday, April 19, 2006		Panel Set: 6

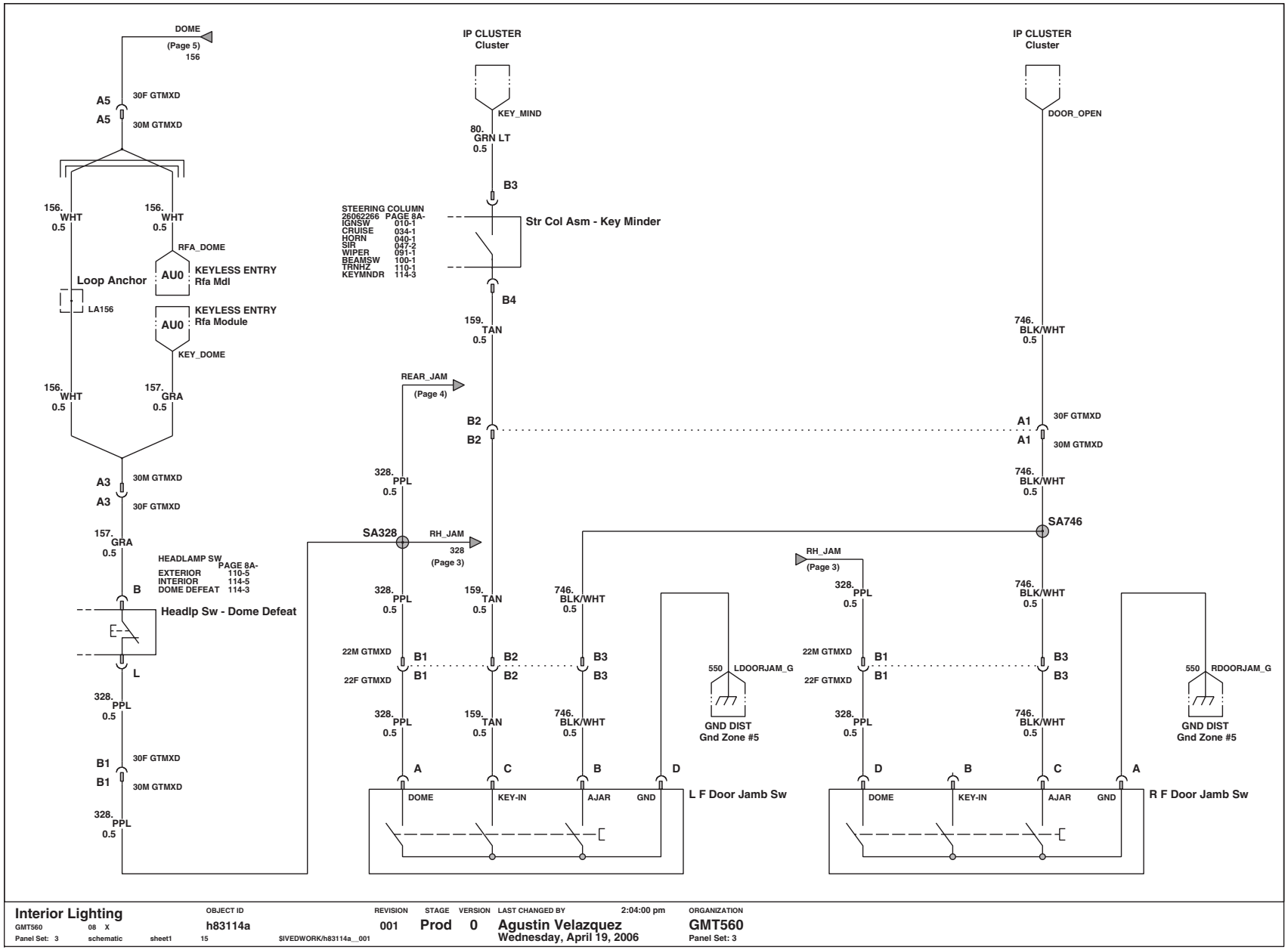
Interior Lighting



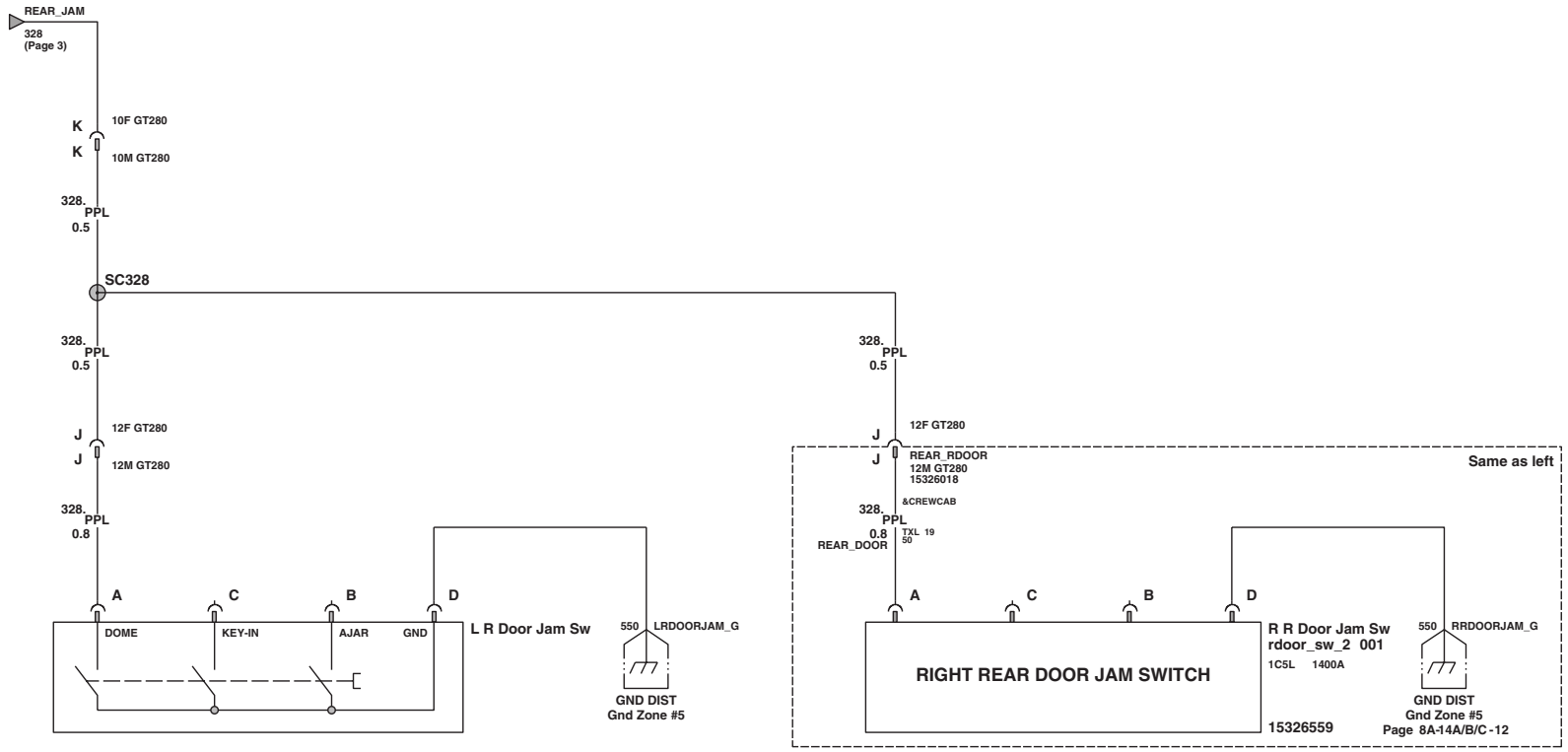
Interior Lighting (continued)



Interior Lighting (continued)

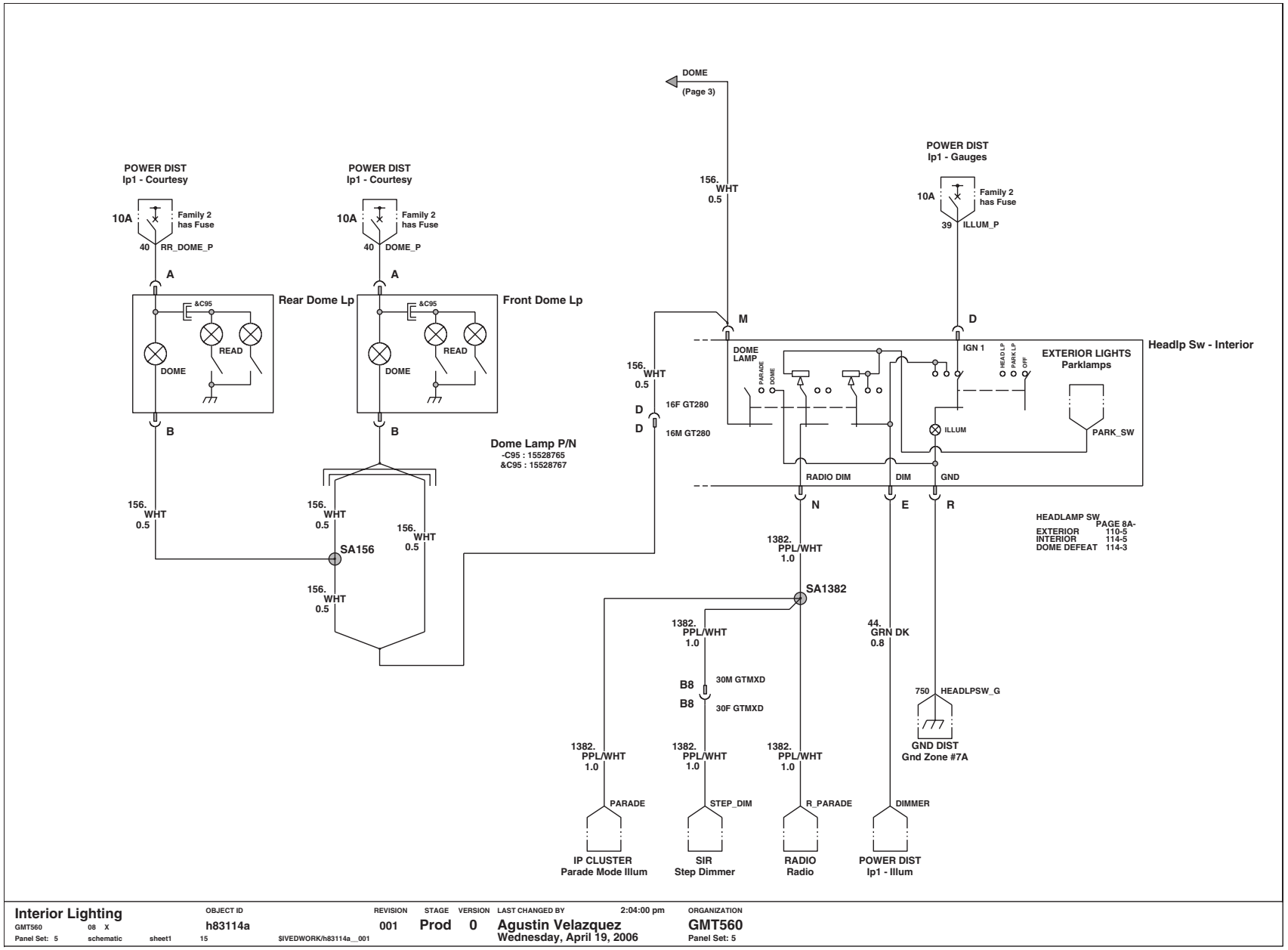


Interior Lighting (continued)



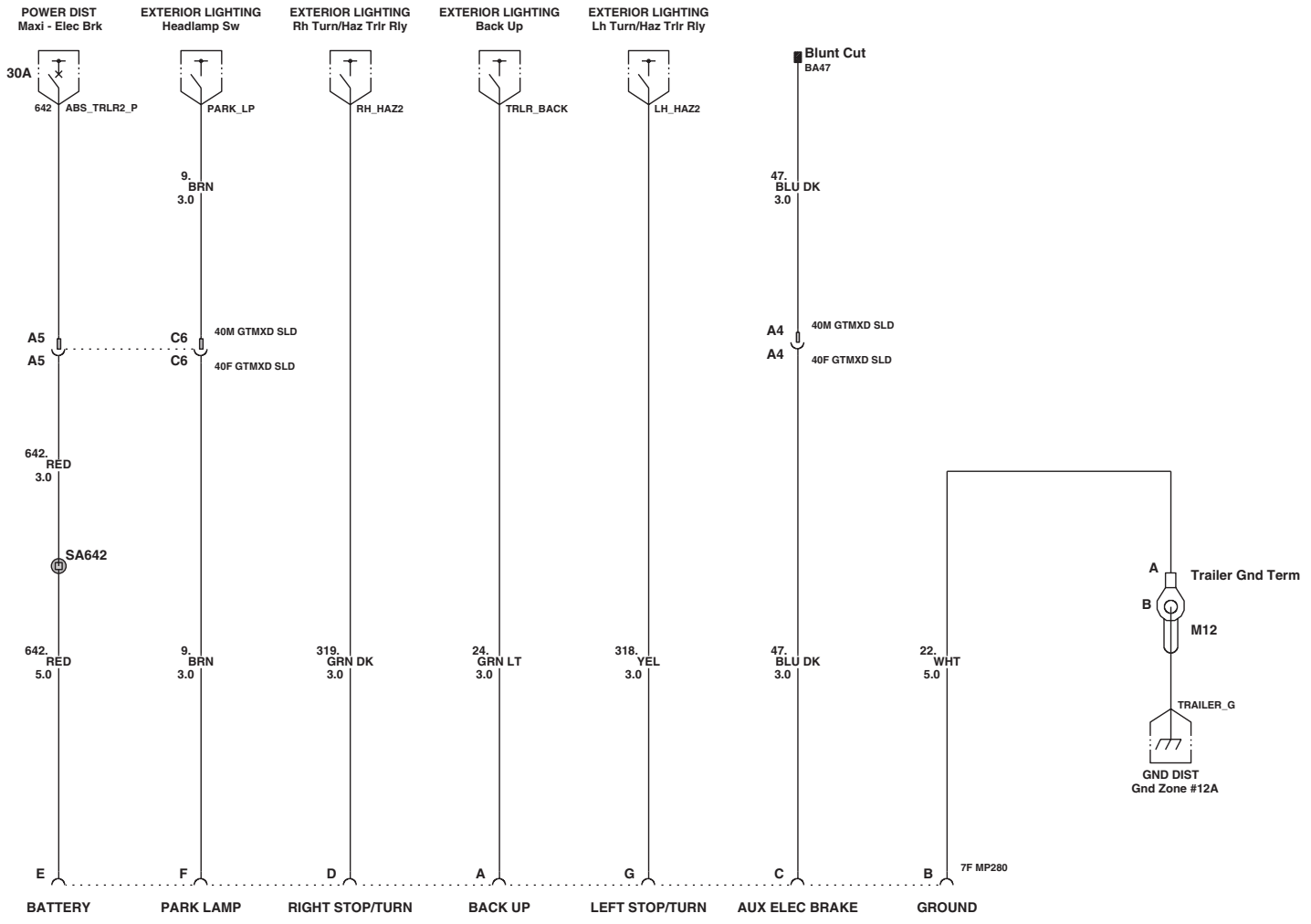
Interior Lighting	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83114a	001	Prod	0	Agustin Velazquez	2:04:00 pm	GMT560
Panel Set: 4 schematic sheet1 15	$IVEDWORK/h83114a__001				Wednesday, April 19, 2006		Panel Set: 4

Interior Lighting (continued)



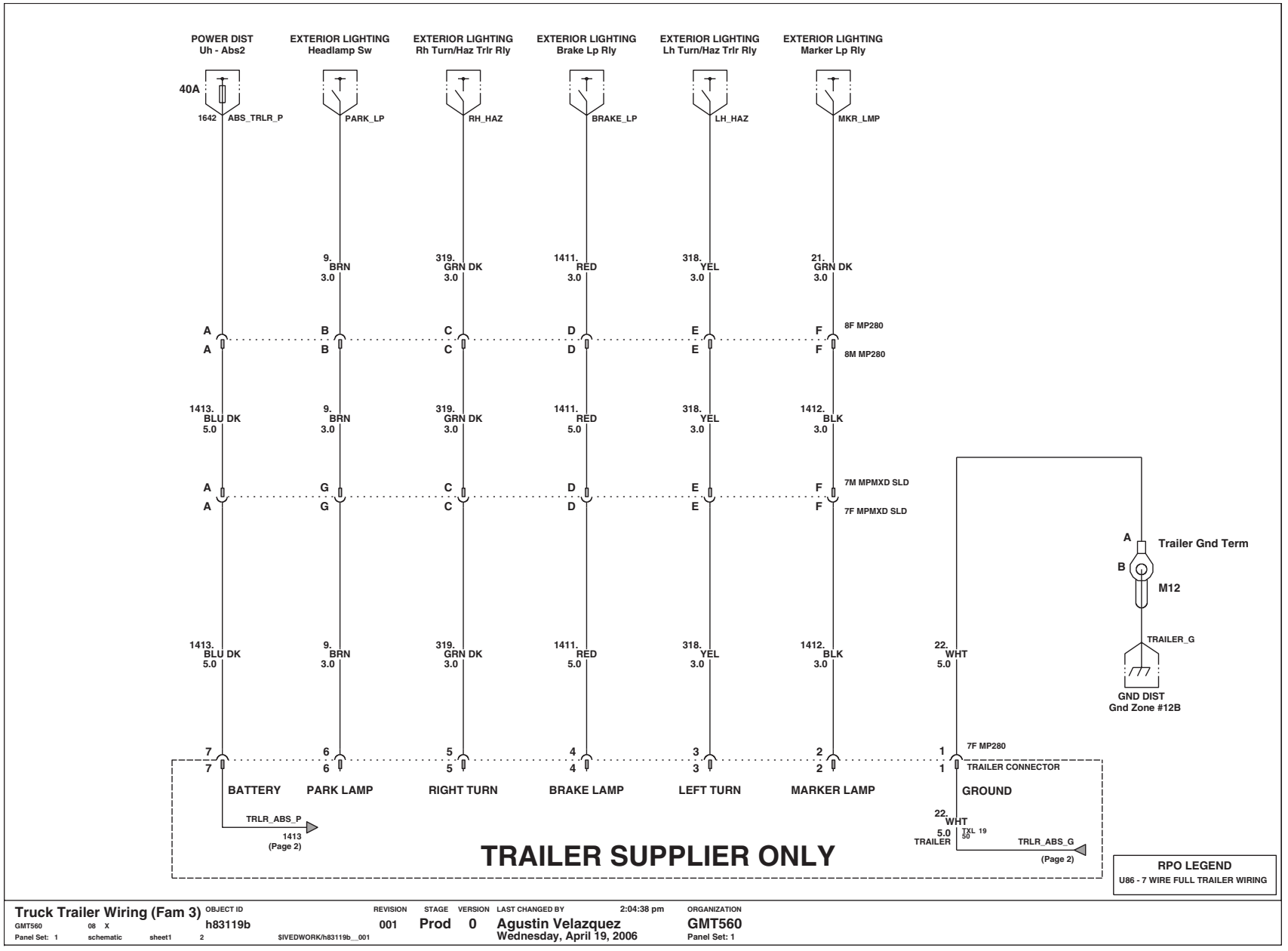
Interior Lighting	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83114a	001	Prod	0	Agustin Velazquez	2:04:00 pm	GMT560
Panel Set: 5 schematic sheet1 15	$IVEDWORK/h83114a__001				Wednesday, April 19, 2006		Panel Set: 5

Truck/Trailer Wiring (Family 2)



Truck Trailer Wiring	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83119a	001	Prod	0	Agustin Velazquez	2:04:26 pm	GMT560
Panel Set: 1 schematic sheet1 2	$IVEDWORK/h83119a__001				Wednesday, April 19, 2006		Panel Set: 1

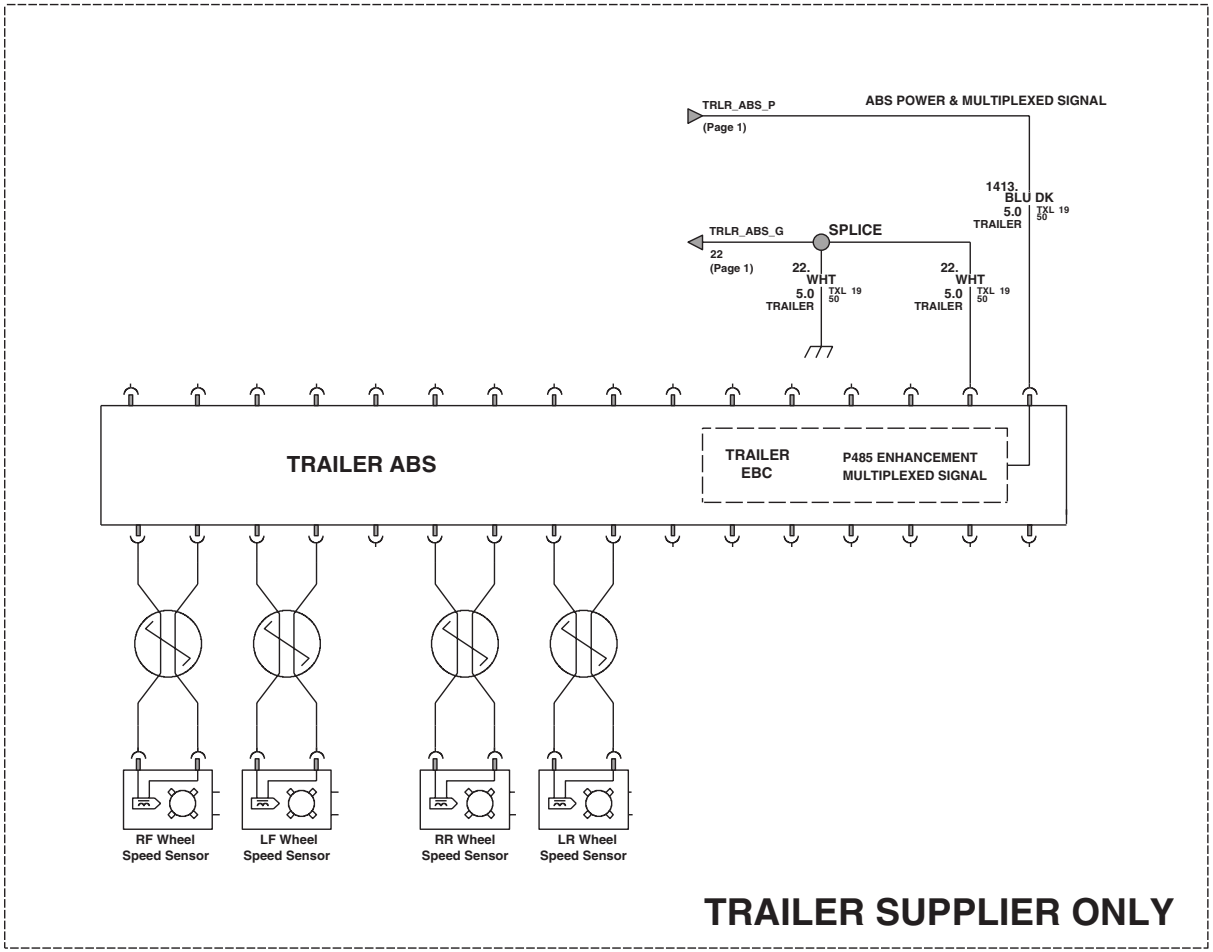
Truck/Trailer Wiring (Family 3)



Truck Trailer Wiring (Fam 3) OBJECT ID h83119b REVISION 001 STAGE Prod VERSION 0 LAST CHANGED BY Agustin Velazquez 2:04:38 pm Wednesday, April 19, 2006 ORGANIZATION GMT560

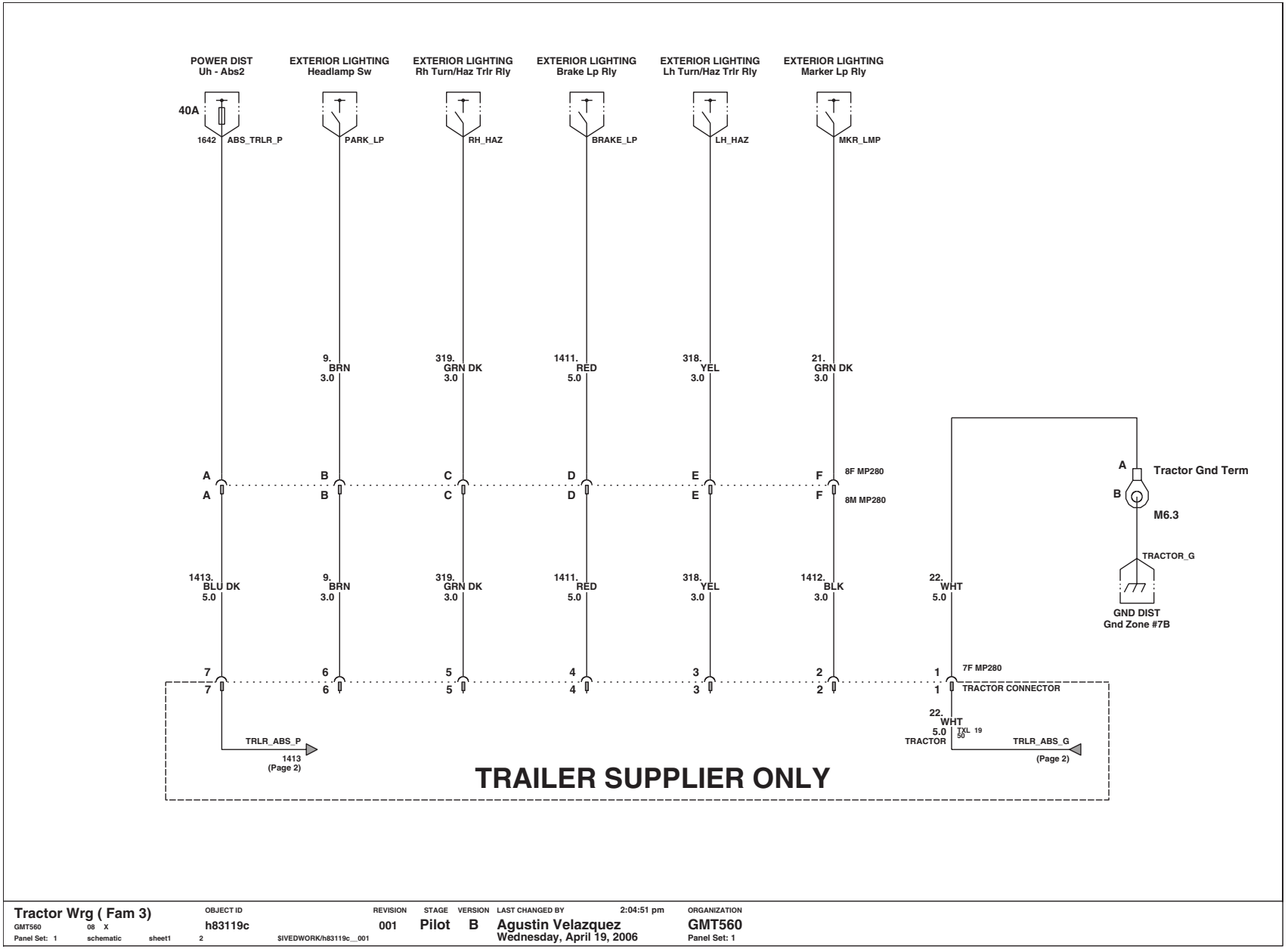
GMT560 08 X Panel Set: 1 schematic sheet1 2 $IVEDWORK/h83119b__001 Panel Set: 1

Truck/Trailer Wiring (Family 3) (continued)



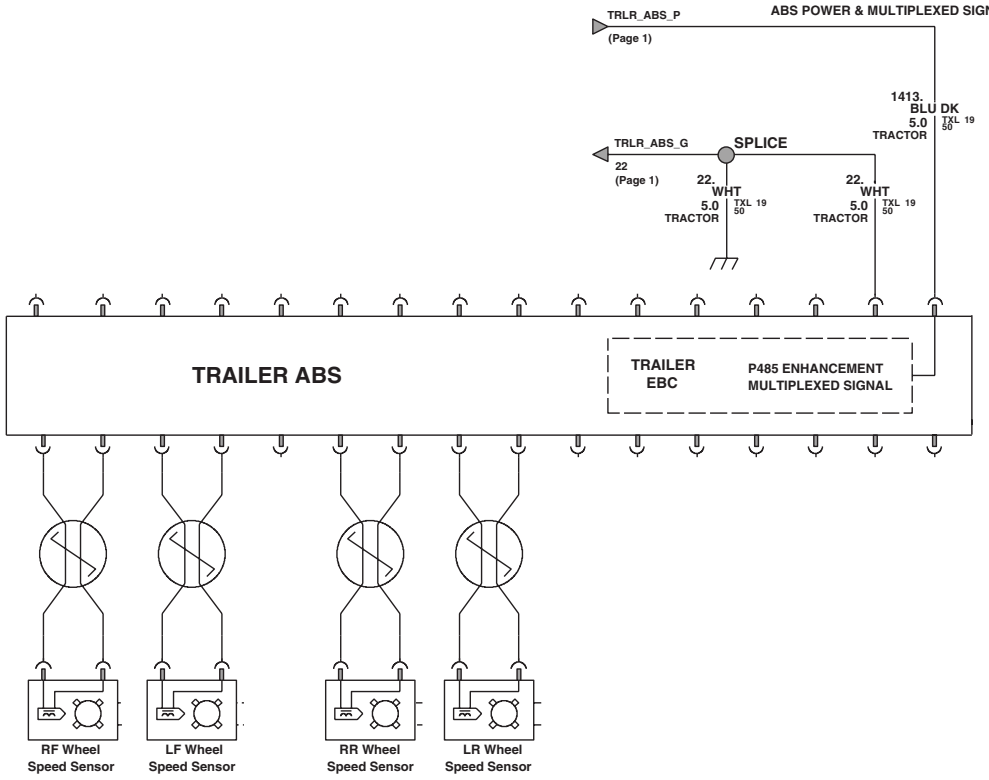
Truck Trailer Wiring (Fam 3) OBJECT ID h83119b REVISION 001 STAGE Prod VERSION 0 LAST CHANGED BY Agustin Velazquez 2:04:38 pm Wednesday, April 19, 2006 ORGANIZATION GMT560
GMT560 08 X Panel Set: 2 schematic sheet1 2 $IVEDWORK/h83119b__001 Panel Set: 2

Tractor Wiring (Family 3)



Tractor Wrg (Fam 3)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83119c	001	Pilot	B	Agustin Velazquez	2:04:51 pm	GMT560
Panel Set: 1 schematic sheet1 2	$IVEDWORK/h83119c__001				Wednesday, April 19, 2006		Panel Set: 1

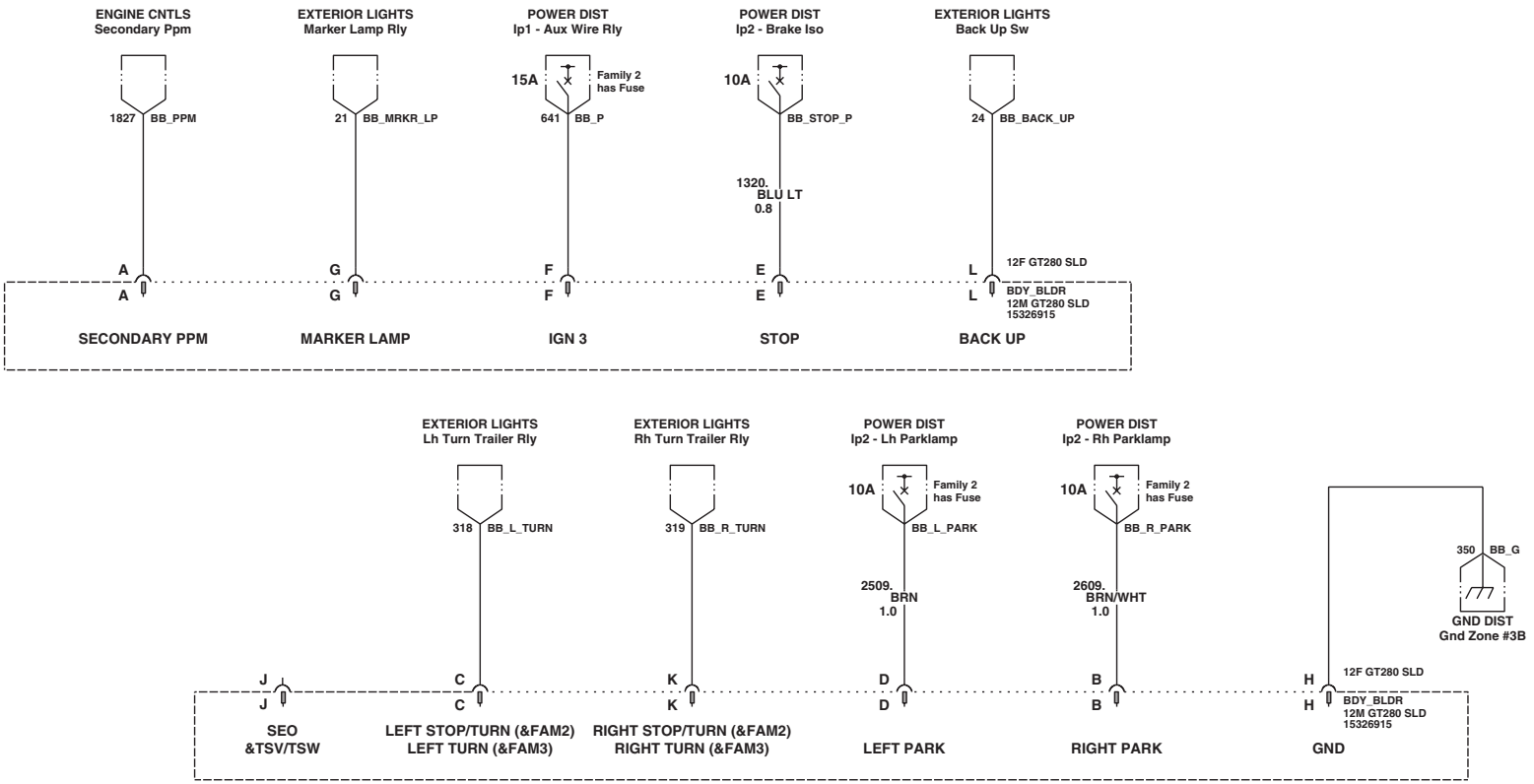
Tractor Wiring (Family 3)



TRAILER SUPPLIER ONLY

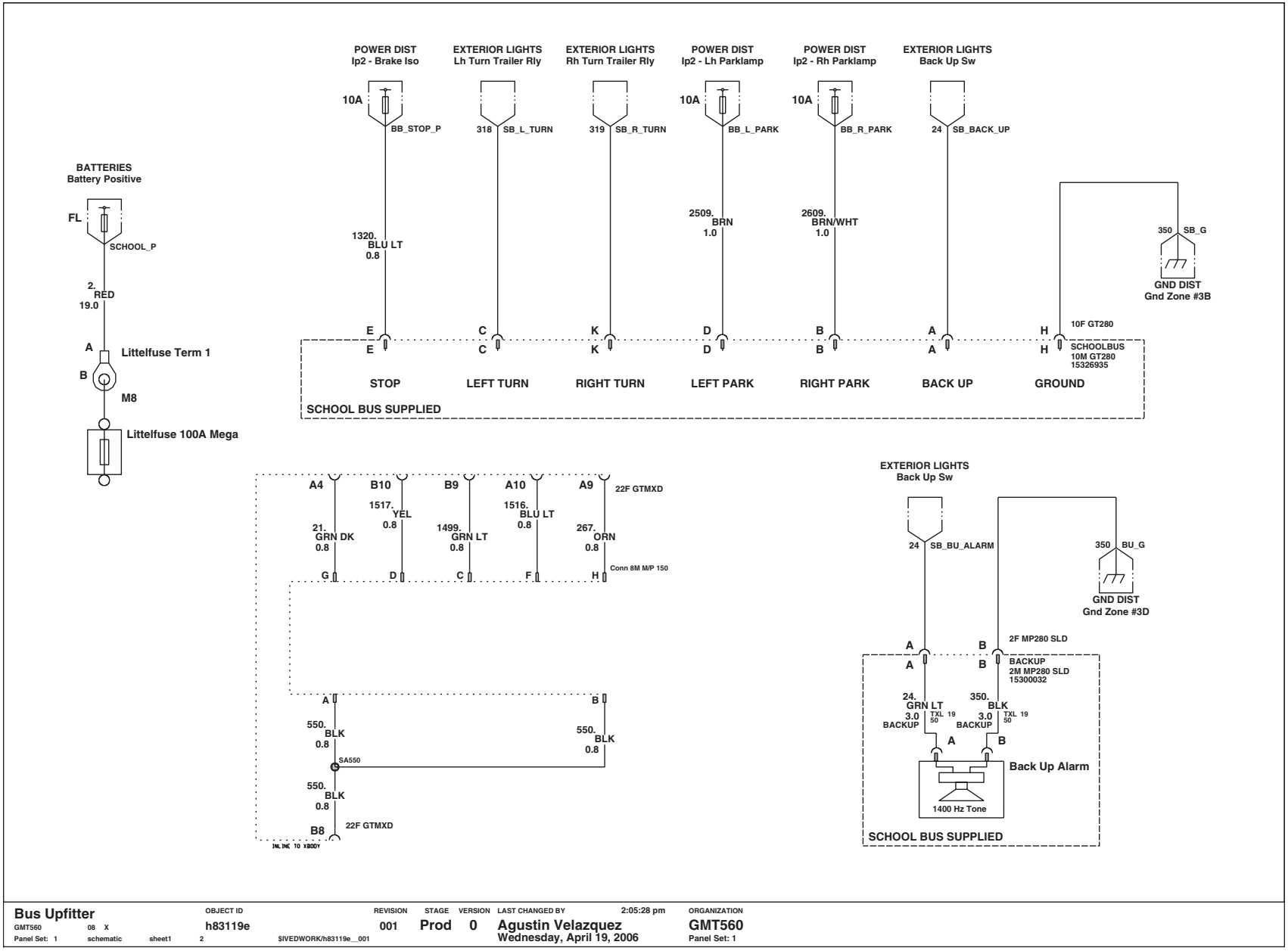
Tractor Wrg (Fam 3)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83119c	001	Pilot	B	Agustin Velazquez	2:04:51 pm	GMT560
Panel Set: 2 schematic sheet1 2	$IVEDWORK/h83119c__001				Wednesday, April 19, 2006		Panel Set: 2

Body Builder Connector



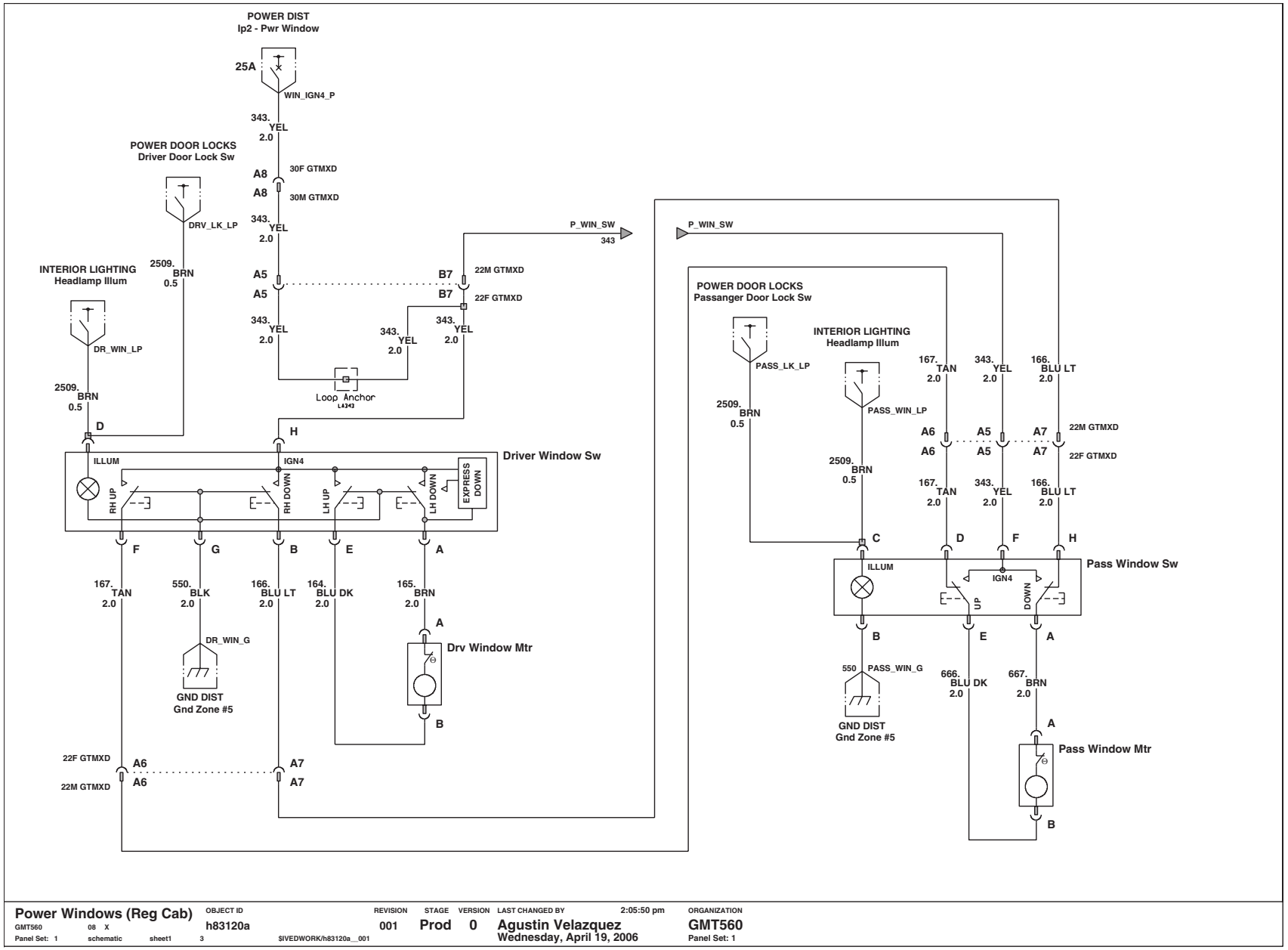
Body Builder Connector	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83119d	001	Prod	0	Agustin Velazquez	2:05:02 pm	GMT560
Panel Set: 1 schematic sheet1 10	$IVEDWORK/h83119d__001				Wednesday, April 19, 2006		Panel Set: 1

School Bus Upfitter



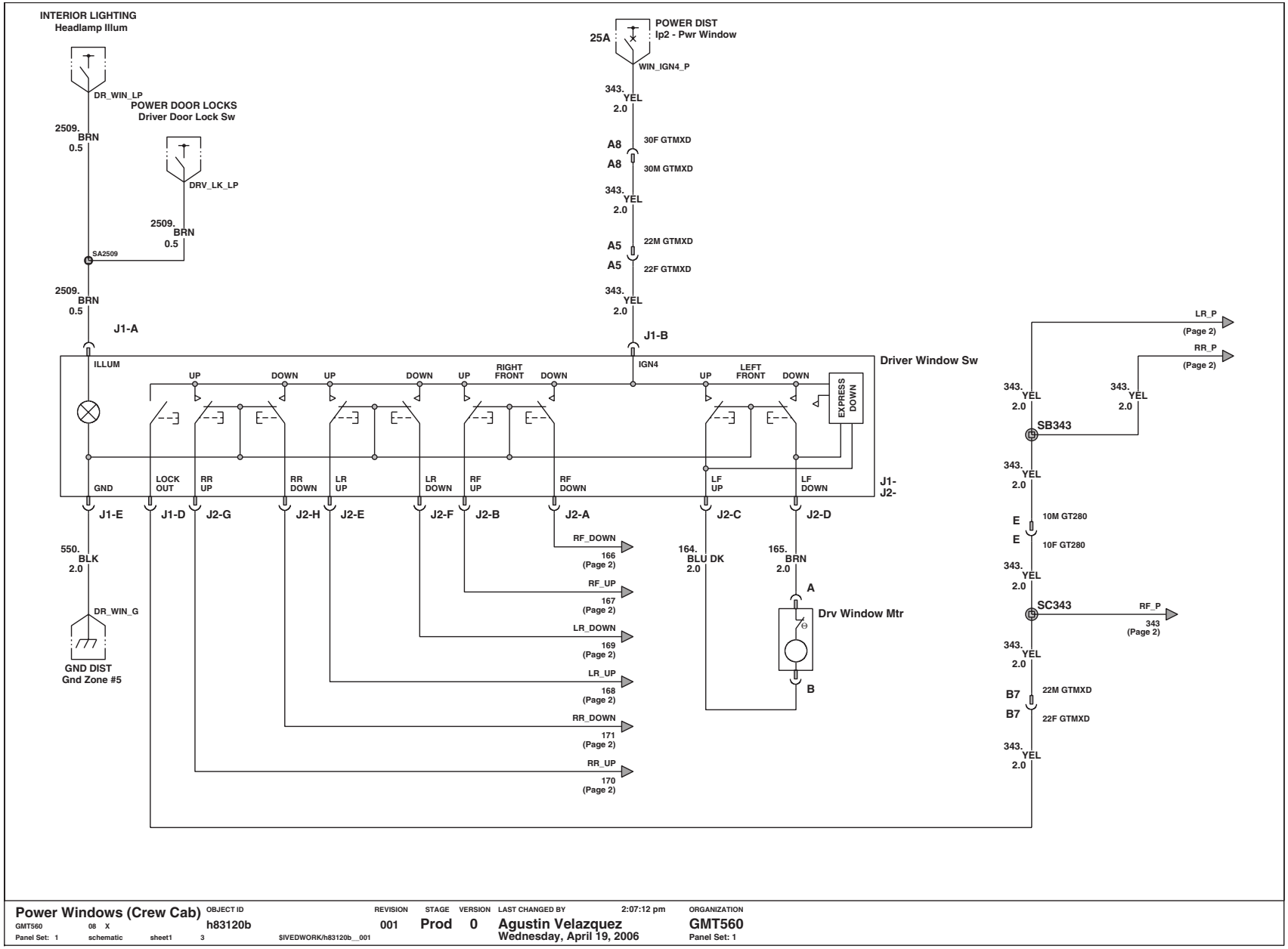
Bus Upfitter	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83119e	001	Prod	0	Agustin Velazquez	2:05:28 pm	GMT560
Panel Set: 1 schematic sheet1 2	$IVEDWORK/h83119e__001				Wednesday, April 19, 2006		Panel Set: 1

Power Windows (Regular Cab)



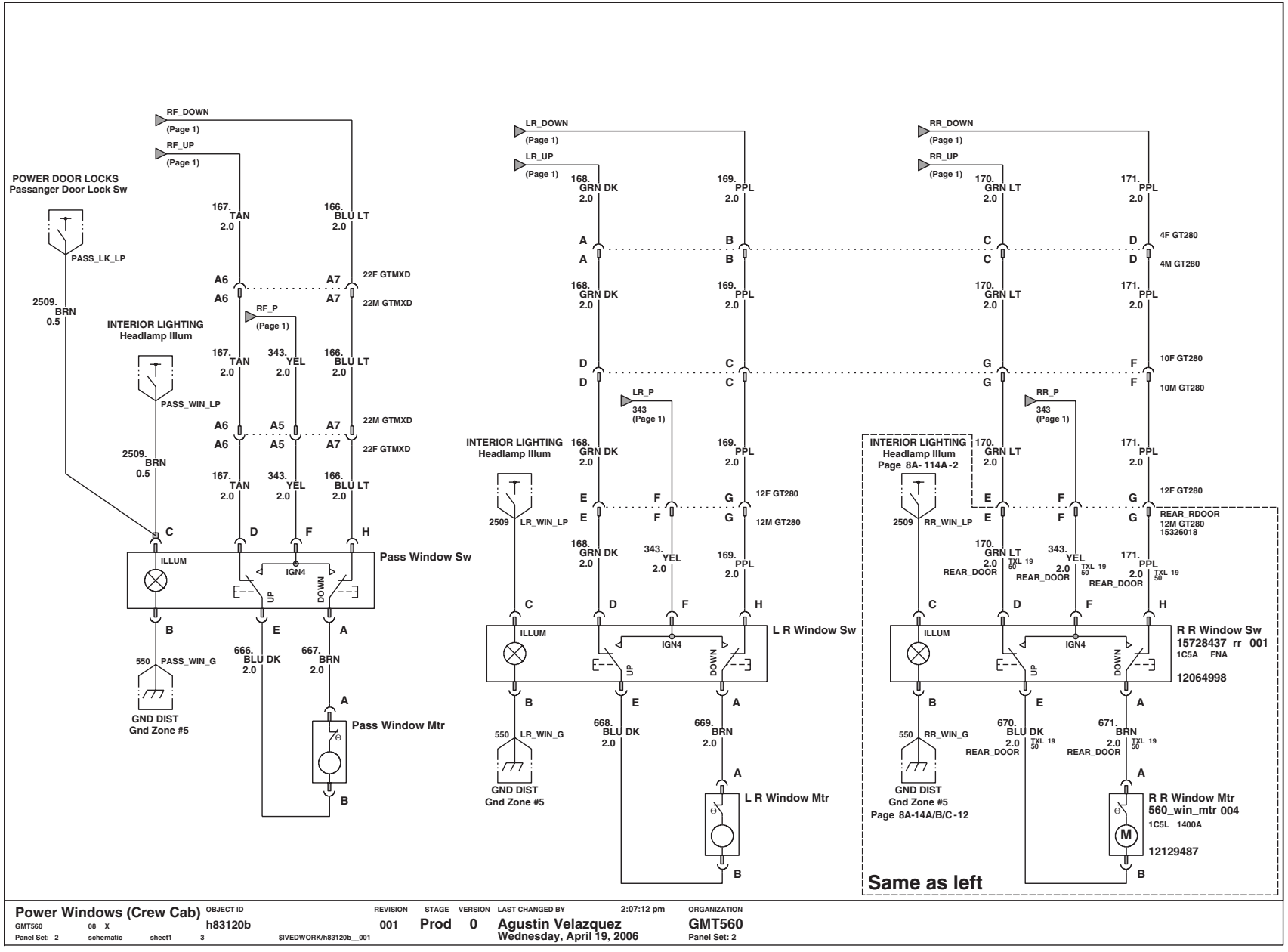
Power Windows (Reg Cab)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83120a	001	Prod	0	Agustin Velazquez	2:05:50 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83120a__001				Wednesday, April 19, 2006		Panel Set: 1

Power Windows (Crew Cab)

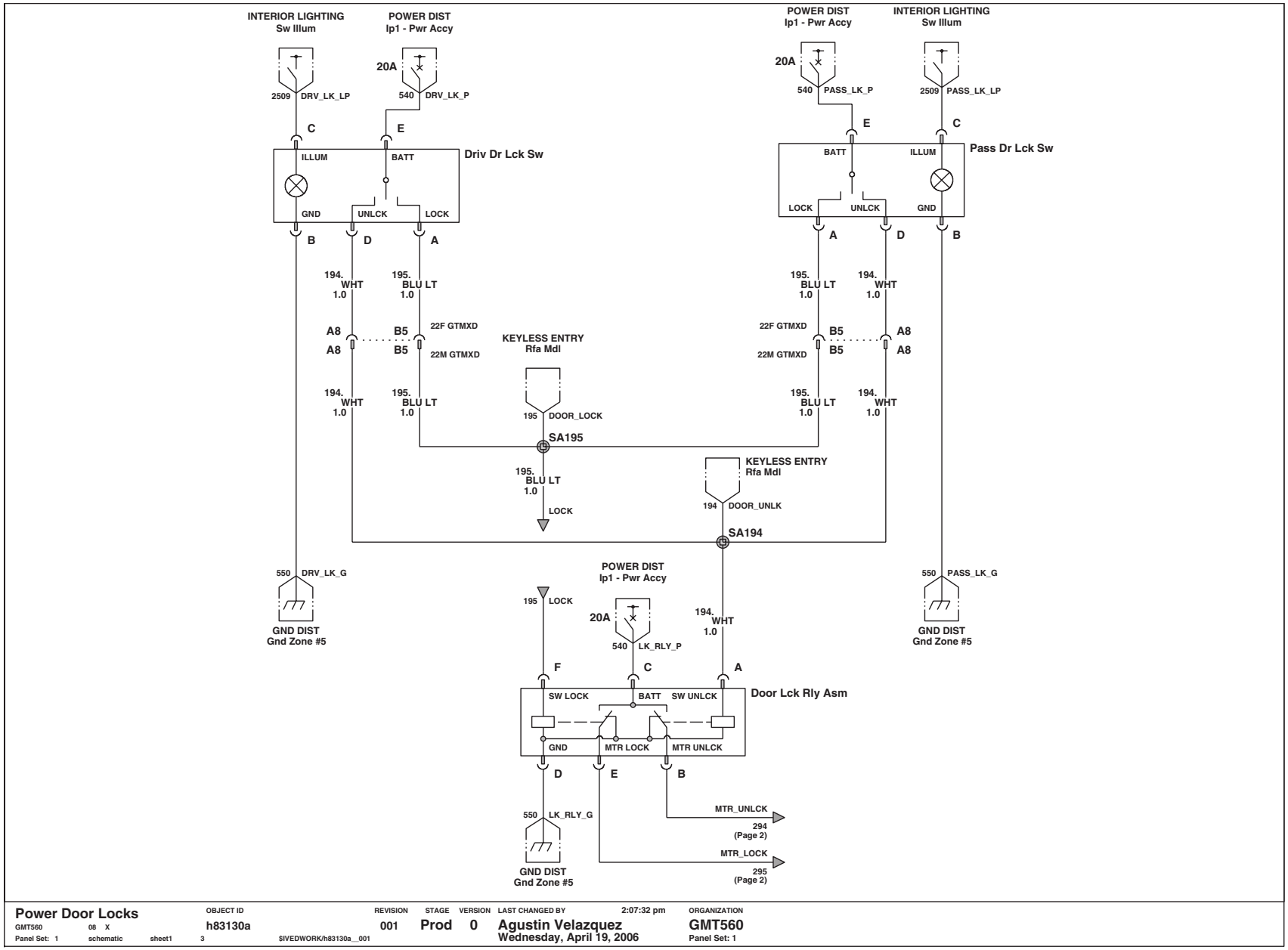


Power Windows (Crew Cab)	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83120b	001	Prod	0	Agustin Velazquez	2:07:12 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83120b__001				Wednesday, April 19, 2006		Panel Set: 1

Power Windows (Crew Cab) (continued)

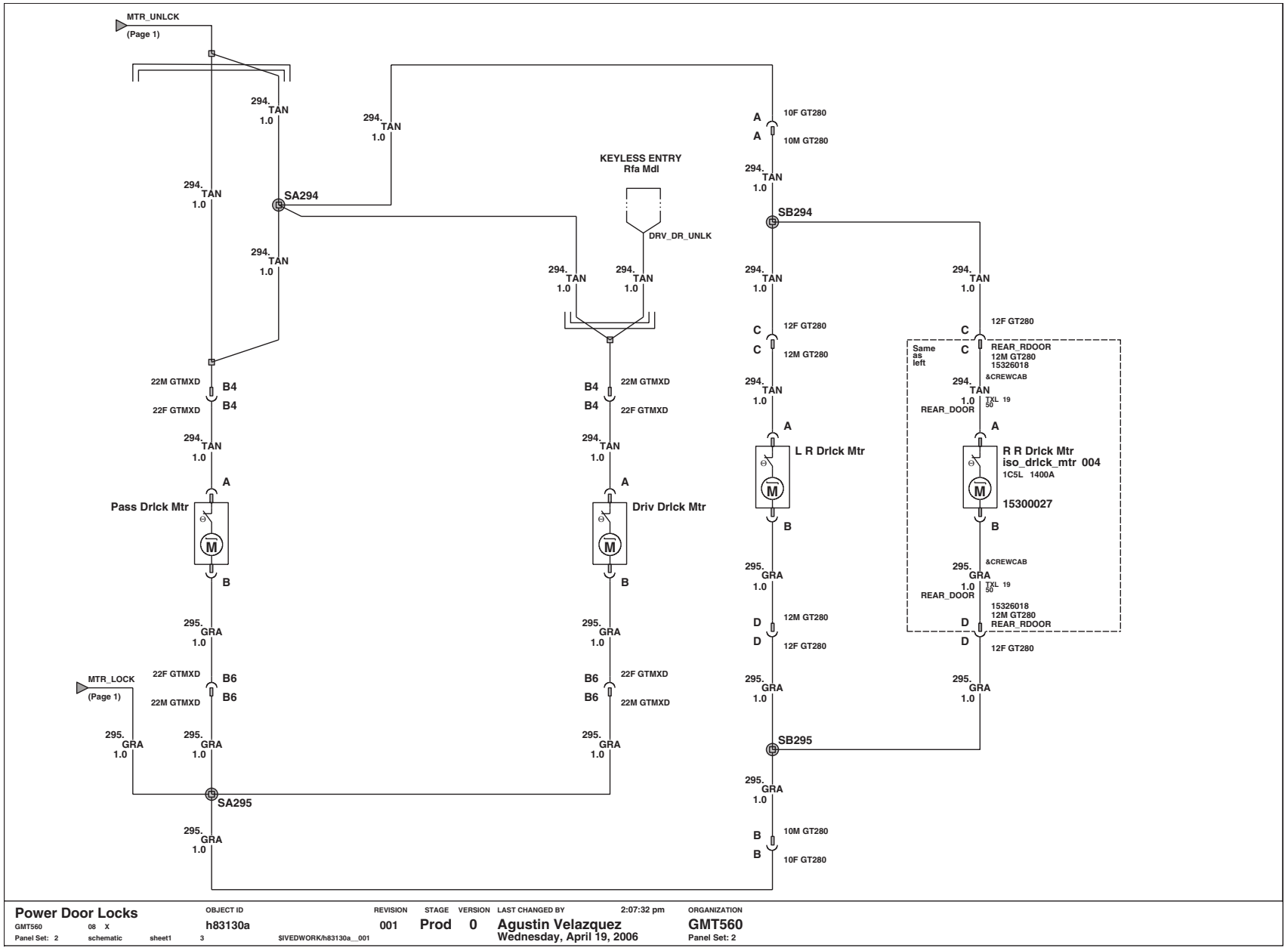


Power Door Locks



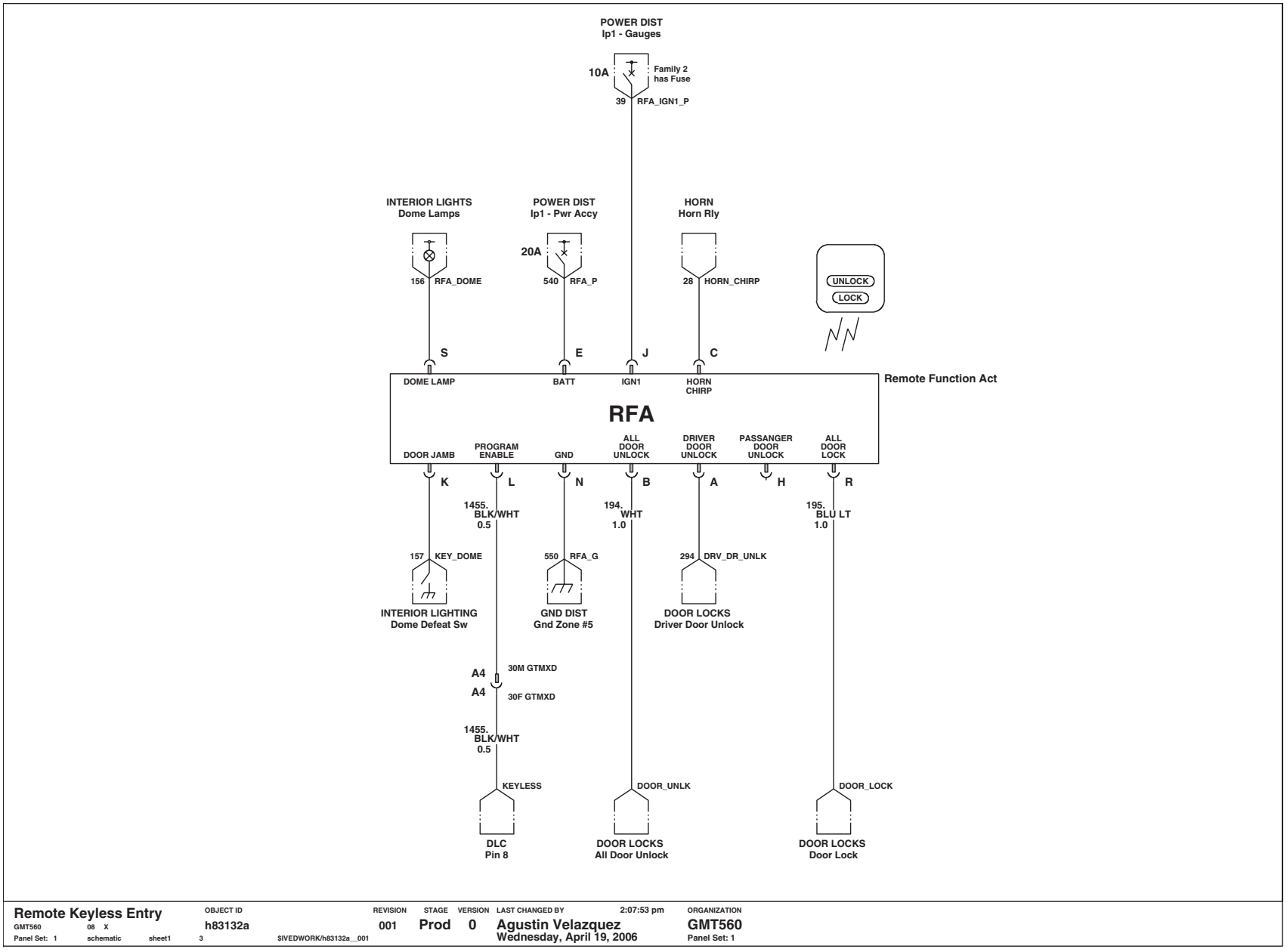
Power Door Locks	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83130a	001	Prod	0	Agustin Velazquez	2:07:32 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83130a__001				Wednesday, April 19, 2006		Panel Set: 1

Power Door Locks (continued)



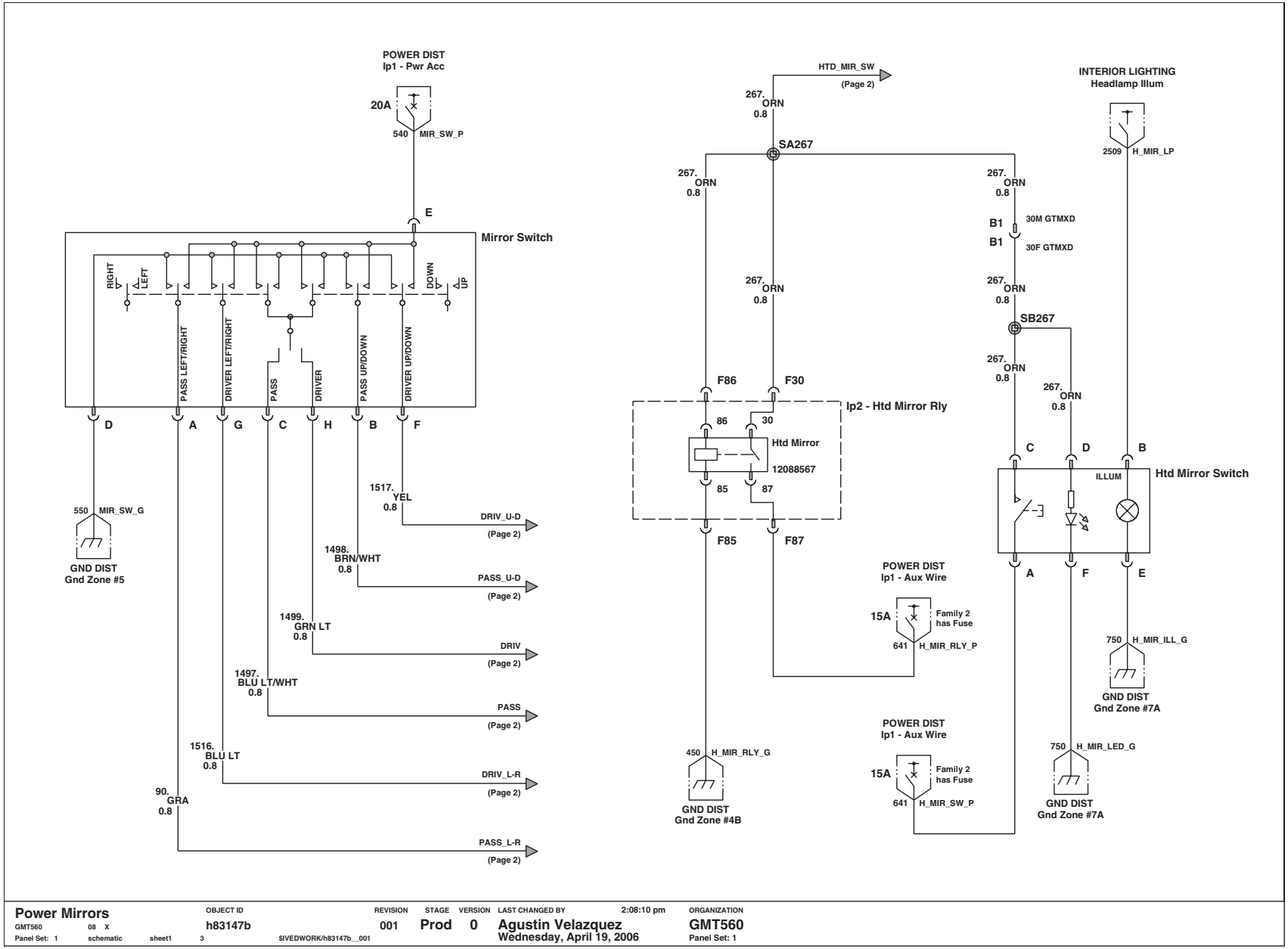
Power Door Locks	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83130a	001	Prod	0	Agustin Velazquez	2:07:32 pm	GMT560
Panel Set: 2 schematic sheet1 3	$IVEDWORK/h83130a__001				Wednesday, April 19, 2006		Panel Set: 2

Remote Keyless Entry (RKE)



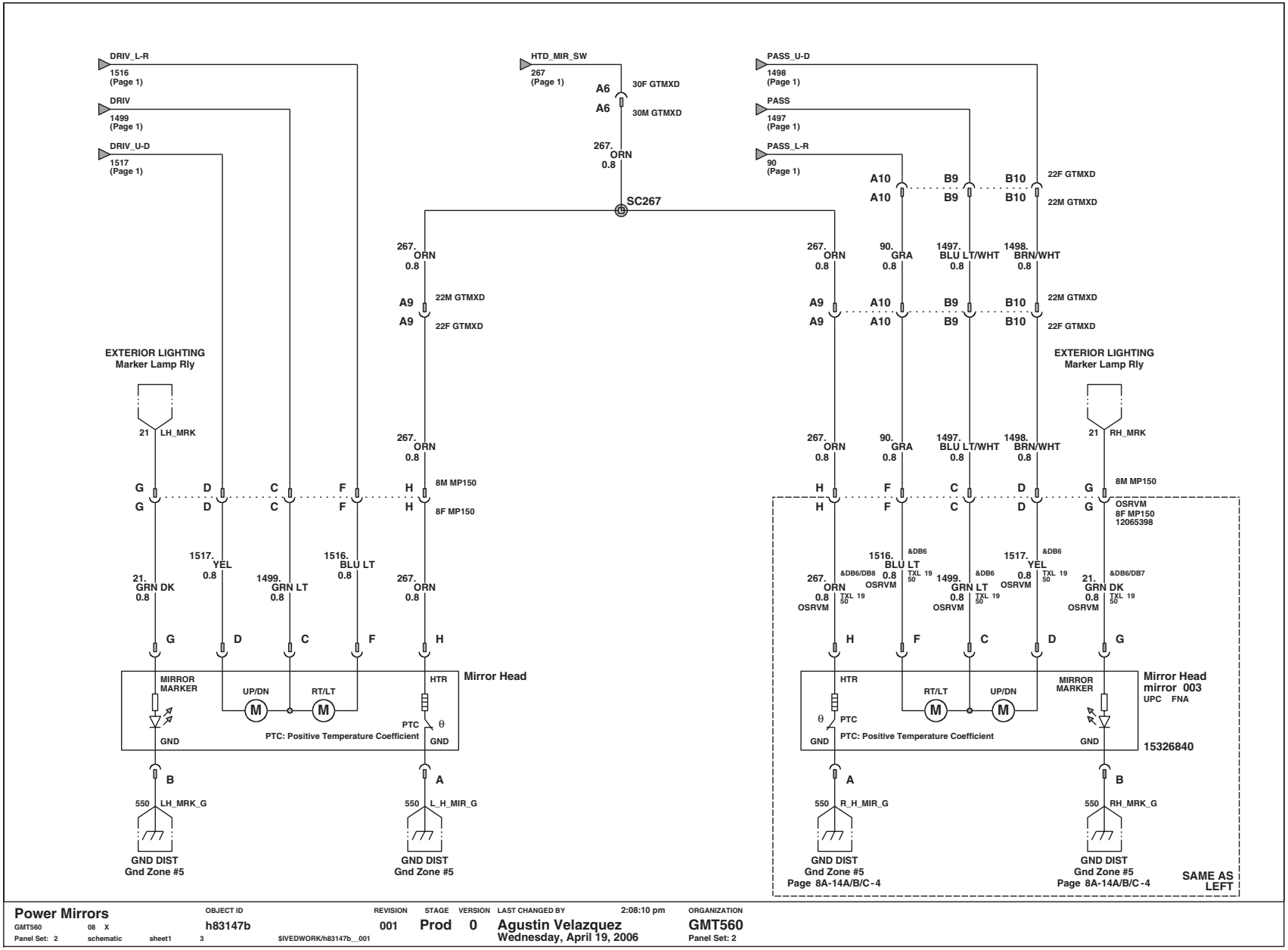
Remote Keyless Entry	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83132a	001	Prod	0	Agustin Velazquez	2:07:53 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83132a__001				Wednesday, April 19, 2006		Panel Set: 1

Power Mirrors



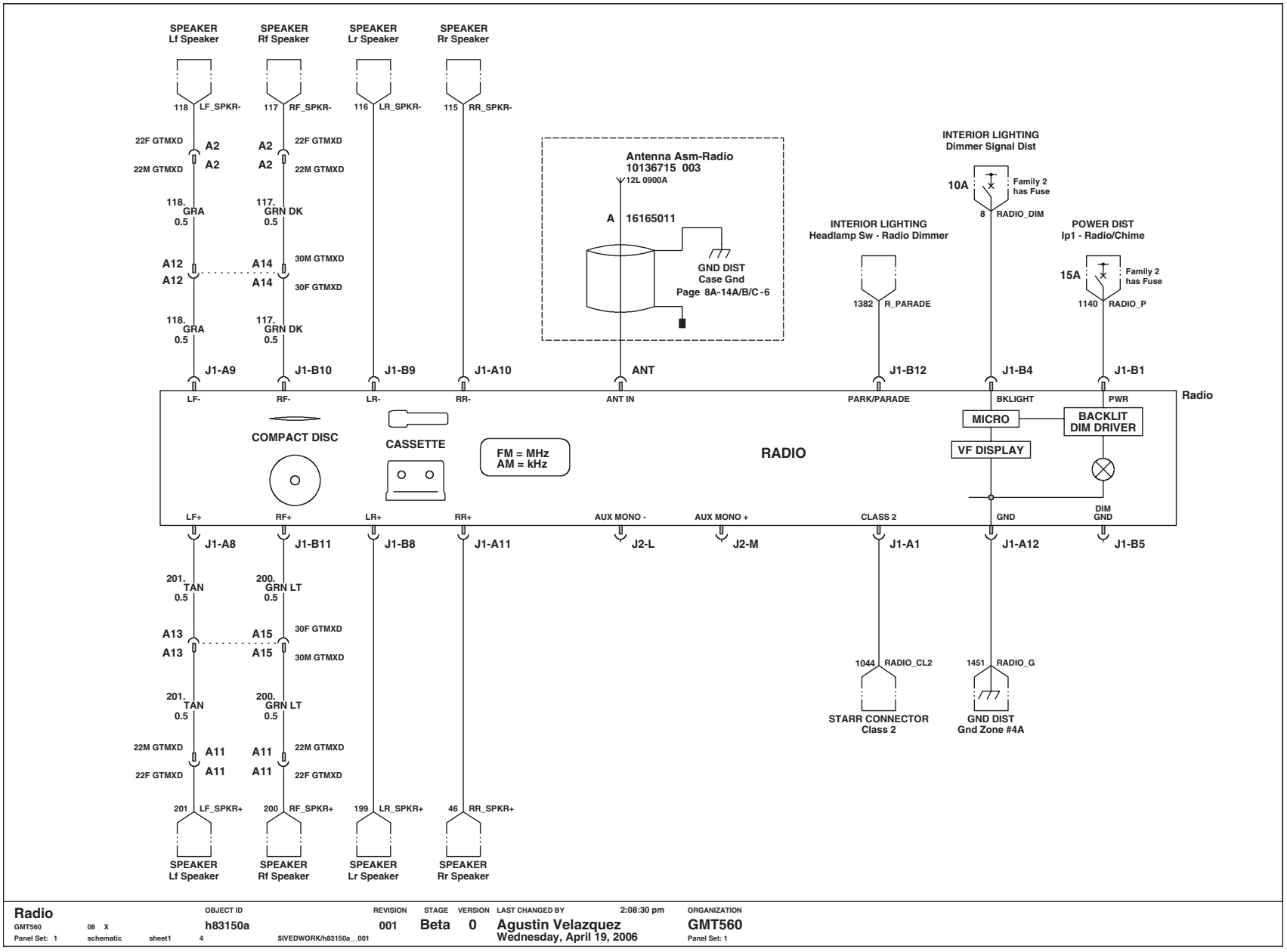
Power Mirrors	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83147b	001	Prod	0	Agustin Velazquez	2:08:10 pm	GMT560
Panel Set: 1 schematic sheet1 3	$IVEDWORK/h83147b__001				Wednesday, April 19, 2006		Panel Set: 1

Power Mirrors (continued)



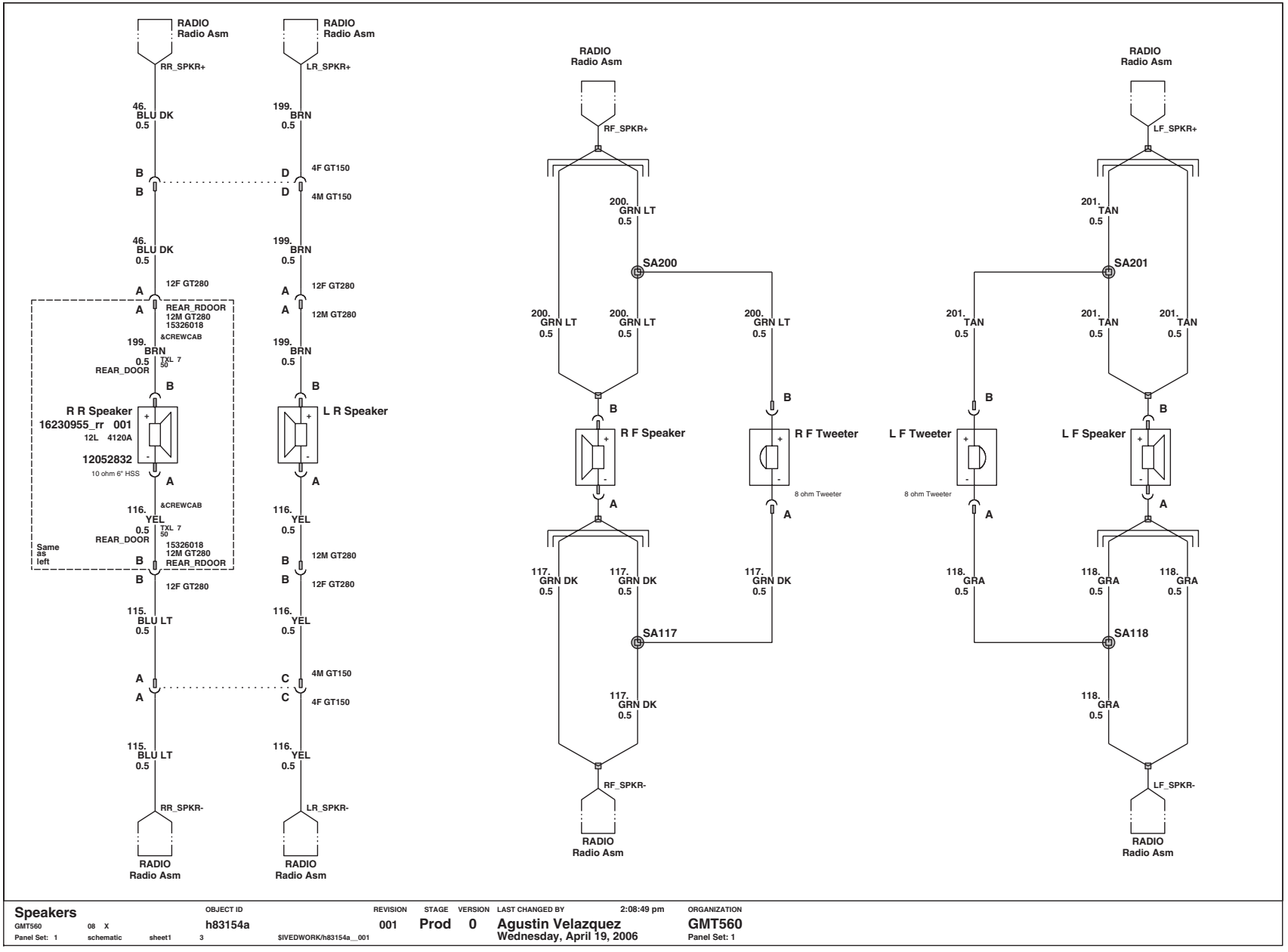
Power Mirrors	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560 08 X	h83147b	001	Prod	0	Agustin Velazquez	2:08:10 pm	GMT560
Panel Set: 2 schematic sheet1 3	$IVEDWORK/h83147b__001				Wednesday, April 19, 2006		Panel Set: 2

Entertainment - Radio



Radio	OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY	2:08:30 pm	ORGANIZATION
GMT560 08 X	h83150a	001	Beta	0	Agustin Velazquez		GMT560
Panel Set: 1 schematic sheet1 4	$IVEDWORK/h83150a__001				Wednesday, April 19, 2006		Panel Set: 1

Entertainment - Speakers



Speakers		OBJECT ID	REVISION	STAGE	VERSION	LAST CHANGED BY		ORGANIZATION
GMT560	08 X	h83154a	001	Prod	0	Agustin Velazquez	2:08:49 pm	GMT560
Panel Set: 1	schematic sheet1 3	$IVEDWORK/h83154a__001				Wednesday, April 19, 2006		Panel Set: 1

UPFITTER'S QUICK REFERENCE

Additional information on existing and new features

Connector/Terminal Contacts

Delphi

Delphi connectors and terminals can purchased via phone by contacting PIONEER at 1-800-PACKARD or on-line through the Power and Signal website at www.powerandsignal.com

Bosch

Bosch connectors and terminals can purchased via phone by contacting CHIEF ENTERPRISES or on-line through their website at www.bsocha@chiefent.com

Bob Socha
Chief Enterprises
Chicago, IL
800-831-7294 ext 217
Cell: 847-894-0311

Sumitomo

Sumitomo connectors and terminals can purchased via phone by contacting SUMITOMO ELECTRIC WIRING SYSTEMS at 270-782-7397 or on-line through their website at www.sewsus.com

Power Take-Off (PTO)/Description & Operation

Table 1: PTO – Preset Mode – Factory Default Settings

Table 2: PTO – Preset Mode – Function Table

Table 3: PTO – Variable Mode

Table 4: PTO – Variable Mode Function Table

Table 5: Reprogramming the PCM/ECM for Fast Idle/PTO

The power take-off (PTO) is an upfitter integrated system that allows the user to create an auxiliary power source that will drive either a hydraulic pump or a generator. When the operator requests PTO the PTO switch will be turned ON and the engine RPM will go to a default standby speed. The PTO solenoid will engage if all of the engage conditions are met. If any of the PTO engage conditions for the specific operating mode are no longer valid, the engine controller will exit out of PTO mode.

The PTO system is integrated with the cruise control and engine control system. The PTO system utilizes the following GM parts:

- The PTO enable switch
- The cruise control multi-function switch
- The PTO relay
- The Powertrain Control Module (PCM) with 8.1L gasoline only
- The Engine Control Module (ECM) with 6.6L or 7.8L diesel only
- The Throttle Actuator Control (TAC) module with 8.1L gasoline only

The following parts are upfitter supplied and installed:

- The load engage switch
- The PTO solenoid

Voltage is supplied with the ignition switch in RUN and START through the engine 1 fuse to the secondary side of the PTO relay and the PTO enable switch. When the PTO switch is turned ON, voltage will be present through the primary side of the PTO relay and at the PTO ON switch signal circuit at the PCM. If the PCM sees all of the PTO engage conditions it will provide a ground for the relay. Current will flow through the coil in the PTO relay and close the normally open contacts. This will allow current to flow to the load engage switch. When the operator closes the load engage switch current will flow to the PTO solenoid. If the PCM sees all of the PTO engage conditions the PCM will send a class 2 signal to the TAC module. The TAC module will use the TAC motor to increase the engine RPM to the standby speed. In the event that any of the PTO requirements are no longer met then the PCM will return the engine RPM to idle and turn the PTO solenoid OFF.

For diesel applications, engine speed is controlled by the ECM and the fuel injection control module (FICM).

(continued on next page)

Power Take-Off (PTO)/Description & Operation (continued)

Modes of Operation

PTO–Preset Mode-Factory Default Settings

The PTO preset mode is normally used for stationary applications. The PTO solenoid will remain engaged while mobile in the preset mode however PTO set and resume speed controls will be inoperative. The engine RPM will also return to normal. This mode provides a default standby speed that varies depending on the engine and transmission combination. This mode also provides 2 default PTO control speeds. Please note that the standby speed is not to be used as a PTO control speed. All vehicles that have the PTO option should be equipped with cruise control.

PTO – Preset Mode-Factory Default Settings

Programmable Settings	Factory Setting (RPM)	Minimum Value (RPM)	Maximum Value (RPM)
PTO Max Engine Speed	2200	L18 - 2100 LMM - 950	L18 - 4200 LMM - 3100
PTO Standby RPM	F2 Auto/F2 Manual/F3 L18 - 800/850/1200 LMM - 850/850	Normal engine idle will override if higher than requested PTO base idle	1300
PTO Set Speed	All/L18 Fam 3 1250/1400	PTO Set speed cannot be set below PTO Standby speed	L18/LMM 4200/3100

PTO Preset Mode Function

The following chart shows how to toggle between the three PTO speeds through the SET and RESUME switches on the cruise control multifunction switch.

PTO Preset Mode Function Table

Present PTO State	Pressing	Resulting PTO State
PTO Standby Speed	SET	PTO Set Speed
PTO Standby Speed	RESUME	PTO Resume Speed
PTO Set Speed	SET	PTO Standby Speed
PTO Set Speed	RESUME	PTO Resume Speed
PTO Resume Speed	SET	PTO Set Speed
PTO Resume Speed	RESUME	PTO Standby Speed

PTO Variable Mode

This PTO speed control mode is used for both stationary and mobile applications. This mode allows PTO to be controlled in a fashion similar to cruise control. The operator is able to hold an engine RPM with the SET switch on the cruise stock. The operator can tap up to increase engine speed in 100 RPM increments with the RESUME switch. The operator may also tap down to decrease engine speed with the SET switch. Variable engine RPM may be obtained by holding either the SET or RESUME switch.

(continued on next page)

Power Take-Off (PTO)/Description & Operation (continued)

(continued from page E-3)

PTO – Variable Mode			
Programmable Settings	**Factory Setting (RPM)**	**Minimum Value (RPM)**	**Maximum Value (RPM)**
PTO Max Engine Speed	2200	L18 - 2100 LMM - 950	L18 - 4200 LMM - 3100
PTO Standby RPM	F2 Auto/F2 Manual/F3 L18 - 800/850/1200 LMM - 850/850	Normal engine idle will override if higher than requested PTO base idle	1300

PTO Variable Mode Function Table		
Switch	**Set**	**Resume (w/Cruise Only)**
Pressed Once	Engine speed will decrease by 100 RPM increments and will maintain new engine speed value. Engine speed can be decreased down to PTO Standby RPM speed value, all further SET inputs will be ignored.	Engine speed will increase by 100 RPM increments and will maintain new engine speed value. Engine speed can be increased up to PTO max engine speed value, all further RESUME inputs will be ignored.
Held	Decelerates engine speed down to the PTO standby speed value	Increases engine speed up to the PTO max engine speed value

Reprogramming the PCM/ECM for Fast Idle/PTO Using the Scan Tool

The scan tool must be used to enable the Fast Idle and PTO options and adjust the factory preset parameters to the desired settings. The scan tool menu driven device is a hand held scan tool that plugs into the datalink connector located underneath the dash near the driver's seat. Once the scan tool is connected, the following chart will guide the user.

Reprogramming the PCM/ECM for Fast Idle/PTO		
Step	**Current menu**	**Select**
1	Main	F0: Diagnostics
2	Vehicle Identification	Year of Vehicle
3	Vehicle Identification	Medium Duty Truck
4	Vehicle Identification	Make
5	Vehicle Identification	Series
6	Powertrain	Engine
7	Powertrain	Automatic or Manual
8	Module Setup	F3: PTO Options
9	Current PTO Settings	Change Options
10	PTO Options	Refer to the following information for the PTO options menu selections

(continued on next page)

Power Take-Off (PTO)/Description & Operation (continued)

To Adjust the Mode of Operation:

The PTO options menu will appear with the selections:

- F0: Fast Idle
- Preset PTO Speed Control
- Variable PTO Speed Control

Once the mode of operation is selected the Current PTO Settings menu will appear with the adjustable parameters for the current mode.

This screen allows the user to increase or decrease engine RPM values using the INCREASE and DECREASE buttons. If the Engine Fault Shutdown feature is selected, the YES or NO Buttons will determine if this feature is enabled.

Important: Please be aware that UF3 and PTO high idle settings must be reprogrammed in the event that the PCM is replaced. It may be advisable to provide the PCM settings information to the customer in case the PCM requires servicing during some point in the life of the vehicle.

After all the settings are adjusted, the user will press the REPROGRAM button and the Current PTO Settings menu will appear with the changes. The ignition must be turned OFF for 10 seconds to ensure that the program values are stored in the PCM.

PTO Components

PTO Switch

The PTO switch is mounted in the left side of the instrument panel. The PTO switch has 2 positions, ON and OFF. When the PTO switch is in the ON position, voltage will be present on the PTO ON switch signal circuit at the relay and the PCM. The PTO indicator is an LED and is integral with the switch The indicator will illuminate when the switch is turned ON. The presence of the indicator being on does not mean that the PTO solenoid is engaged. The cruise control multi-function switch must be used in conjunction with the PTO switch. Illumination of the switch is provided through the dimming circuit.

Cruise Control Multi-Function Switch

Engine speed control of the PTO system must controlled by the function control switches located on the multifunction turn signal lever. The cruise control function control switches includes the ON/OFF, SET/COAST, and RESUME/ACCEL. The switch assembly provides driver control of the PTO as well as the cruise control system. The SET/COAST and RESUME/ACCEL switches may be used to increase and decrease engine RPM. See the chart above for recommended speeds.

PTO Relay

The PTO relay is located on the side of the underhood fuse block. Voltage is supplied with the ignition switch in RUN and START through the Engine 1 fuse to the secondary side of the PTO relay. The PTO switch controls the voltage to the primary side of the PTO relay while the PCM controls the ground.

(continued on next page)

Power Take-Off (PTO)/Description & Operation (continued)

Load Engage Switch

The load engage switch is an upfitter supplied and installed part. The switch is remote. Voltage is supplied by the PTO relay to the normally open contacts of the switch. When the switch is closed current will flow to the PTO solenoid.

PTO Solenoid

The solenoid is an upfitter supplied part and is replaceable on most PTOs. The PTO solenoid is used on clutch activated PTOs. The PTO relay supplies the solenoid with voltage when the relay is energized.

PCM

The PCM is the control center of the PTO system. Applications with a 6.6L or 7.8L diesel use an ECM. The PCM monitors numerous engine and vehicle functions. To engage the PTO, the PCM must see the following conditions:

- The engine must be running
- The transmission must be in PARK or NEUTRAL
- The park brake must be set for manual transmission only
- The vehicle speed must be zero in Preset Mode only
- The brake or clutch must not be depressed

The PCM constantly looks at the information from various sensors and other inputs, and controls the systems that affect vehicle performance. The PCM also performs a diagnostic test on the electronic throttle control system.

TAC Module

The TAC module is the control center for the electronic throttle system. The TAC module and the PCM communicate through a dedicated redundant serial data circuit. The TAC module and the PCM monitor the commanded throttle position and compare the commanded position to the actual throttle position. This is accomplished by monitoring the APP and the throttle position (TP) sensor. These 2 values must be within a calibrated value of each other or a DTC may be set. The TAC module also monitors each individual circuit of the TP sensor and the APP to verify proper operation. The TAC module commands the TAC motor to increase or decrease the engine RPM.

TAC Motor

The TAC motor is part of the throttle body and controls the positions of the throttle. The motor is bi-directional and is controlled by the TAC module. The TAC motor increases or decreases the engine RPM.

Power Take-Off (PTO)/Diagnostic Checks – Diagnostic Starting Point/Symptoms

Diagnostic Starting Point – Power Take-Off (PTO):

Important: The following steps must be completed before using the symptom tables.

1. Review the system Description and Operation in order to familiarize yourself with the system functions. Refer to Power Take-Off (PTO) Description and Operation.
2. Perform the Diagnostic System Check - Vehicle before using the Symptom Tables in order to verify that all of the following are true:
   - There are no Diagnostic Trouble Codes (DTCs) set.
   - The control module or modules can communicate via the serial data link.

Visual Physical Inspection

- Inspect the easily accessible and visible system components for obvious damage or conditions which could cause the symptom.
- Inspect the transmission for the proper transmission fluid level.
- Inspect the hydraulic reservoir for the proper hydraulic fluid level.
- Inspect the upfitter connections at the transmission.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions.

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- Power Take-Off Does Not Engage
- Engine RPM Does Not Increase With Power Take-Off Engaged
- Power Take-Off Indicator Inoperative

Symptoms – Power Take-Off (PTO):

Important: The following steps must be completed before using the symptom tables.

1. Perform the Diagnostic System Check – Vehicle, before using the Symptom Tables in order to verify that allof the following are true:
   - There are no Powertrain Control Module (PCM) or Engine Control Module (ECM) Diagnostic Trouble Codes (DTCs) set.
   - The vehicle modules can communicate to each other via the serial data links.

2. Review the system operation in order to familiarize yourself with the system functions. Refer to Power Take-Off (PTO) Description and Operation.

(continued on next page)

Power Take-Off (PTO)/Diagnostic Checks – Symptoms (continued)

Visual Physical Inspection

- Inspect the upfitter connections of the PTO system. Refer to Checking Aftermarket Accessories.
- Inspect the easily accessible and the visible system components for obvious damage.
- Inspect the transmission and hydraulic pump for the proper fluid level.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to Testing for Intermittent Conditions and Poor Connections.

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- Power Take-Off Does Not Engage
- Engine RPM Does Not Increase With Power Take-Off Engaged
- Power Take-Off Indicator Inoperative

Power Take-Off (PTO)/Diagnostic Checks – PTO Does Not Engage

Circuit Description

This symptom chart will aid in diagnosing a failed Power Take-Off (PTO) solenoid engagement. This diagnostic will not expose a mechanical problem with the PTO itself. With the ignition switch in RUN or START, voltage is supplied through the Engine 1 fuse to the secondary side of the relay. When the relay is energized the contacts will close and voltage will be present at the load engage switch. When the operator needs the PTO he will close the load engage switch and current will flow to the PTO solenoid. The solenoid has its own external ground. When the operator turns the ignition switch to RUN, voltage will be present at the PTO enable switch. When the PTO enable switch is turned to ON voltage will be present at the coil of the relay and at the powertrain control module (PCM). If the PCM sees all of the conditions necessary to engage the solenoid, the PCM will ground the primary circuit of the relay. The operation of a diesel system is the same except that diesel engines have an engine control module (ECM) instead of a PCM.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step tests engine controls and cruise control for Diagnostic Trouble Codes (DTCs).
3. This step tests for an open Engine 1 fuse.
4. This step tests the Power Distribution circuits.
5. This step tests for voltage to the PTO solenoid.
6. This step tests for continuity on the ground circuit.
7. This step tests for voltage at the Ignition 1 Voltage and PTO On Switch-Signal circuits.
8. This step tests the PTO control circuit.
9. This step tests for continuity on the PTO control circuit.
10. This step ensures that all of the PCM conditions for engaging the PTO are met.
11. This step tests for ground on the Ignition 1 Voltage circuit.
12. This step tests for a ground on the PTO supply voltage circuit.
13. This step tests the PTO solenoid for an internal ground.
14. This step tests for ground on the Ignition 1 Voltage circuit.
17. This step tests for voltage at the PTO On Switch-Signal circuit.
18. This step tests for voltage at the Ignition 1 Voltage circuit.
19. This step tests the PTO Relay.

(continued on next page)

Power Take-Off (PTO)/Diagnostic Checks – PTO Does Not Engage (continued)

Schematic Reference: **Power take-off (PTO) Schematics**			
Step	**Action**	**Yes**	**No**
1	Did you review the Power Take-Off (PTO) Description and Operations and perform the necessary inspections?	Go to Step 2	Go to Power Take-Off (PTO) Description and Operation
2	Did you perform the Diagnostic System Check-Vehicle?	Go to Step 3	Go to Diagnostic System Check-Vehicle
3	Inspect the Engine 1 fuse. *Is the fuse open?*	Go to Step 11	Go to Step 4
4	1. Turn the ignition switch to RUN. 2. With a test lamp test for voltage to the Engine 1 fuse. *Does the test lamp light?*	Go to Step 5	Go to Step 24
5	1. Ensure that all of the PTO engage conditions are met. Refer to Power Take-off (PTO) Description and Operation. 2. Turn the PTO enable switch to ON. 3. Turn the load engage switch to ON. 4. With a test lamp for voltage on the PTO Supply-Voltage circuit at the PTO solenoid. *Does the test lamp light?*	Go to Step 6	Go to Step 7
6	With a DMM test for continuity on the ground circuit at the PTO solenoid. *Do you have continuity?*	Go to Step 29	Go to Step 25

Schematic Reference: **Power take-off (PTO) Schematics** *(continued)*			
Step	**Action**	**Yes**	**No**
7	1. Turn all switches OFF. 2. Disconnect the relay connector. 3. Turn the ignition switch to RUN. 4. Turn the PTO enable switch to ON. Using a test lamp for voltage at the Ignition 1 and PTO On Switch-Signal circuits at the relay connector. *Does the test lamp light on both tests?*	Go to Step 8	Go to Step 16
8	1. Turn all switches OFF. 2. Connect the PTO relay. 3. Turn the ignition switch to RUN. 4. Turn the PTO enable switch to ON. 5. Turn the load engage switch to ON. 6. Ensure that all PTO Engage conditions are met. Refer to Power Take-Off (PTO) Description and Operation. 7. Using a jumper wire ground the PTO Control circuit at the relay. *Does the PTO solenoid engage?*	Go to Step 9	Go to Step 19
9	Test for continuity on the PTO Control circuit. *Does the PTO Control circuit have continuity?*	Go to Step 10	Go to Step 26
10	Ensure that all of the PCM conditions for engaging the PTO are met. Refer to Power Take-Off Description and Operation. *Are all of the conditions met?*	Go to Step 31	Go to Step 27

(continued on next page)

Power Take-Off (PTO)/Diagnostic Checks – PTO Does Not Engage (continued)

Schematic Reference: Power take-off (PTO) Schematics (continued)			
Step	**Action**	**Yes**	**No**
11	1. Remove the Engine 1 fuse. 2. Disconnect the PTO relay. 3. Using a DMM test for ground on the Ignition 1 Voltage circuit at the relay connector. *Is the PTO Supply-Voltage circuit grounded?*	Go to Step 22	Go to Step 13
12	1. Disconnect the PTO solenoid connector. 2. Using a DMM test for ground on the PTO Supply-Voltage circuit at the relay connector. *Is the PTO Supply-Voltage circuit grounded?*	Go to Step 23	Go to Step 29
13	1. Disconnect both the positive and negative leads of the PTO solenoid. 2. Using a DMM test for ground on the positive lead at the PTO solenoid. *Is positive lead at the PTO solenoid grounded?*	Go to Step 23	Go to Step 29
14	1. Remove the Engine 1 fuse. 2. Disconnect the PTO enable switch. 3. Using a DMM test for ground on the Ignition 1 Voltage circuit at the switch connector. *Is the Ignition 1 Voltage circuit grounded?*	Go to Step 21	Go to Step 15
15	1. Disconnect the PTO Relay. 2. Using a DMM test for ground on the PTO On Switch-Signal circuit at the relay connector. *Is PTO On Switch-Signal circuit grounded?*	Go to Step 20	Go to Step 28

Schematic Reference: Power take-off (PTO) Schematics (continued)			
Step	**Action**	**Yes**	**No**
16	Do you have voltage on the Ignition 1 Voltage circuit?	Go to Step 17	Go to Step 22
17	1. Remove the PTO enable switch from the instrument panel, but leave it connected to the harness. 2. Using a fused jumper wire, jump from the Ignition 1 Voltage circuit to the PTO On Switch-Signal circuit at the switch. 3. Using a test lamp test for voltage at the PTO On Switch-Signal circuit at the PTO relay connector. *Do you have voltage?*	Go to Step 28	Go to Step 18
18	1. Turn the ignition switch OFF. 2. Turn the PTO enable switch OFF. 3. Disconnect the PTO enable switch. 4. Turn the ignition switch to RUN. 5. Using a test lamp test for voltage at the Ignition 1 Voltage circuit at the switch connector. *Do you have voltage?*	Go to Step 20	Go to Step 21
19	1. Disconnect the PTO Relay. 2. Using a fused jumper wire, jump from the Ignition 1 Voltage circuit to the PTO Supply-Voltage circuit at the relay connector. *Does the PTO Solenoid engage?*	Go to Step 30	Go to Step 23
20	Repair the PTO on switch-signal circuit for an open, short to ground or high resistance. Refer to Wiring Repairs. *Did you complete the repair?*	Go to Step 32	--

(continued on next page)

Power Take-Off (PTO)/Diagnostic Checks – PTO Does Not Engage (continued)

Schematic Reference: Power take-off (PTO) Schematics (continued)			
Step	**Action**	**Yes**	**No**
21	Repair the Ignition 1 Voltage circuit for an open, short to ground or high resistance. Refer to Wiring Repairs.. *Did you complete the repair?*	Go to Step 32	--
22	Repair the Ignition 1 Voltage circuit for an open, short to ground or high resistance. Refer to Wiring Repairs.. *Did you complete the repair?*	Go to Step 32	--
23	Repair the PTO supply-voltage circuit for an open, short to ground or high resistance. Refer to Wiring Repairs.. *Did you complete the repair?*	Go to Step 32	--
24	Repair the affected power distribution circuit for an open, short to ground or high resistance. Refer to Wiring Repairs.. *Did you complete the repair?*	Go to Step 32	--
25	Repair the ground circuit for an open, short to ground or high resistance. Refer to Wiring Repairs.. *Did you complete the repair?*	Go to Step 32	--
26	Repair the PTO control circuit for an open, short to ground or high resistance. Refer to Wiring Repairs.. *Did you complete the repair?*	Go to Step 32	--
27	Repair the malfunctioning PTO support circuit. *Did you complete the repair?*	Go to Step 32	--

Schematic Reference: Power take-off (PTO) Schematics (continued)			
Step	**Action**	**Yes**	**No**
28	Repair the PTO enable switch. Refer to Upfitter instructions. *Did you complete the repair?*	Go to Step 32	--
29	Replace the PTO solenoid. Refer to Upfitter instructions. *Did you complete the repair?*	Go to Step 32	--
30	Replace the PTO relay. Refer to Upfitter instructions. *Did you complete the repair?*	Go to Step 32	--
31	Replace the PCM or ECM. Refer to Control Module References for replacement, setup and programming. *Did you complete the repair?*	Go to Step 32	--
32	Test drive the vehicle and operate the PTO system as described in the supporting text. *Does the symptom occur?*	Go to Step 2	System OK

Power Take-Off (PTO)/Diagnostic Checks – Engine RPM Does Not Increase with PTO Engaged

Circuit Description

When the power take-off (PTO) enable switch is turned to the ON position and all PTO engage conditions are met, the engine RPM should increase to the standby speed. When the powertrain control module (PCM) receives the signal from the PTO switch the PCM will send a signal to the throttle actuator control (TAC) module. The TAC module controls the TAC motor which changes the position of the throttle. Communications between the 2 modules is monitored and checked for accuracy by the PCM. Diagnostic trouble codes (DTCs) may be recorded in the event of the failure. Diesel engines do not have a TAC system and the engine RPM is strictly controlled by the engine control module (ECM).

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2. This step checks for other system DTCs that may affect the PTO.
6. This step tests the PCM for the PTO Enable signal.
7. This step tests the communication between the PCM and the TAC module.
8. This step tests the PTO On Switch Signal circuit.
9. This step tests the PTO On Switch-Signal circuit for an open, high resistance or short to ground.
10. This step tests the Serial Data circuits for an open, high resistance or short to ground.

Schematic Reference: **Power take-off (PTO) Schematics** and Cruise Control Schematics

Step	Action	Yes	No
1	Did you review the Power Take-Off (PTO) Description and Operation and perform the necessary inspections	Go to Step 2	Go to Power Take-Off Description and Operation
2	Verify the fault is present. *Does the system operate normally?*	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 3
3	Did you perform the Diagnostic System Check-Vehicle?	Go to Step 4	Go to Diagnostic System Check-Vehicle
4	Does the PTO solenoid engage?	Go to Step 5	Go to Power Take-Off (PTO) Does Not Engage
5	Is the engine a diesel?	Go to Step 8	Go to Step 6

(continued on next page)

Power Take-Off (PTO)/Diagnostic Checks – Engine RPM Does Not Increase with PTO Engaged (continued)

Schematic Reference: **Power take-off (PTO) Schematics** and Cruise Control Schematics *(continued)*

Step	Action	Yes	No
6	1. Start the engine. 2. Ensure that all of the PTO engage conditions are met. Refer to Power Take-Off (PTO) Description and Operation. 3. Turn the PTO enable switch to ON. 4. Using a test lamp test for voltage to the PCM on the PTO On Switch Signal circuit. *Does the test lamp illuminate?*	Go to Step 7	Go to Step 9
7	Using the scan tool read the TAC/PCM communication signal on the Engine Controls Data List. *Does the scan tool display OK?*	Go to Diganostic Starting Point – Cruise Control	Go to Step 10
8	1. Depending on the specific diesel engine application, disconnect the appropriate connector at the ECM. 2. Turn the ignition swithc to RUN. 3. Turn the PTO enable switch to ON. 4. Using a test lamp test for voltage to the ECM on the PTO On Switch Signal circuit. *Does the test lamp light?*	Go to Diganostic Starting Point – Engine Controls for the 6.6L engine or Diagnostic Starting Point – Engine Controls for the 7.8L engine	Go to Step 9
9	Test the PTO On Switch-Signal circuit for an open, high resistance or short to ground. *Did you find and correct the condition?*	Go to Step 13	Go to Step 12

Schematic Reference: **Power take-off (PTO) Schematics** and Cruise Control Schematics *(continued)*

Step	Action	Yes	No
10	Test the Serial Data circuits for an open, high resistance or short to ground. Refer to Cruise Control Schematics. *Did you find and correct the condition?*	Go to Step 13	Go to Step 11
11	Replace the TAC module. Refer to Control Module References for replacement, setup and programming. *Did you complete the replacement?*	Go to Step 13	--
12	Replace the PCM or ECM. Refer to Control Module References for replacement, setup and programming. *Did you complete the replacement?*	Go to Step 13	--
13	Test drive the vehicle and operate the PTO system as described in the supporting text. *Does the symptom occur?*	Go to Step 3	System OK

Power Take-Off (PTO)/Diagnostic Checks – PTO Indicator Inoperative

Circuit Description

This symptom chart will aid in diagnosing a failed Power Take-Off (PTO) indicator. This diagnostic assumes that the PTO solenoid is functional and only the indicator is failing to come on. When the ignition switch is in RUN, voltage should be present on the Ignition 1 Voltage circuit. When the PTO switch is turned to ON, the LED will illuminate. The indicator has its own ground circuit. The PTO enable switch indicator and PTO solenoid have different ground circuits. Therefore, the indicator may be illuminated when the PTO solenoid is disengaged.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4. This step tests the PTO On switch signal circuit.
5. This step tests the ground circuit.

Schematic Reference: **Power take-off (PTO) Schematics**

Step	Action	Yes	No
1	Did you review the Power Take-Off (PTO) Description and Operation and perform the necessary inspections	Go to Step 2	Go to Power Take-Off Description and Operation
2	Verify the fault is present. *Does the system operate normally?*	Go to Testing for Intermittent Conditions and Poor Connections	Go to Step 3

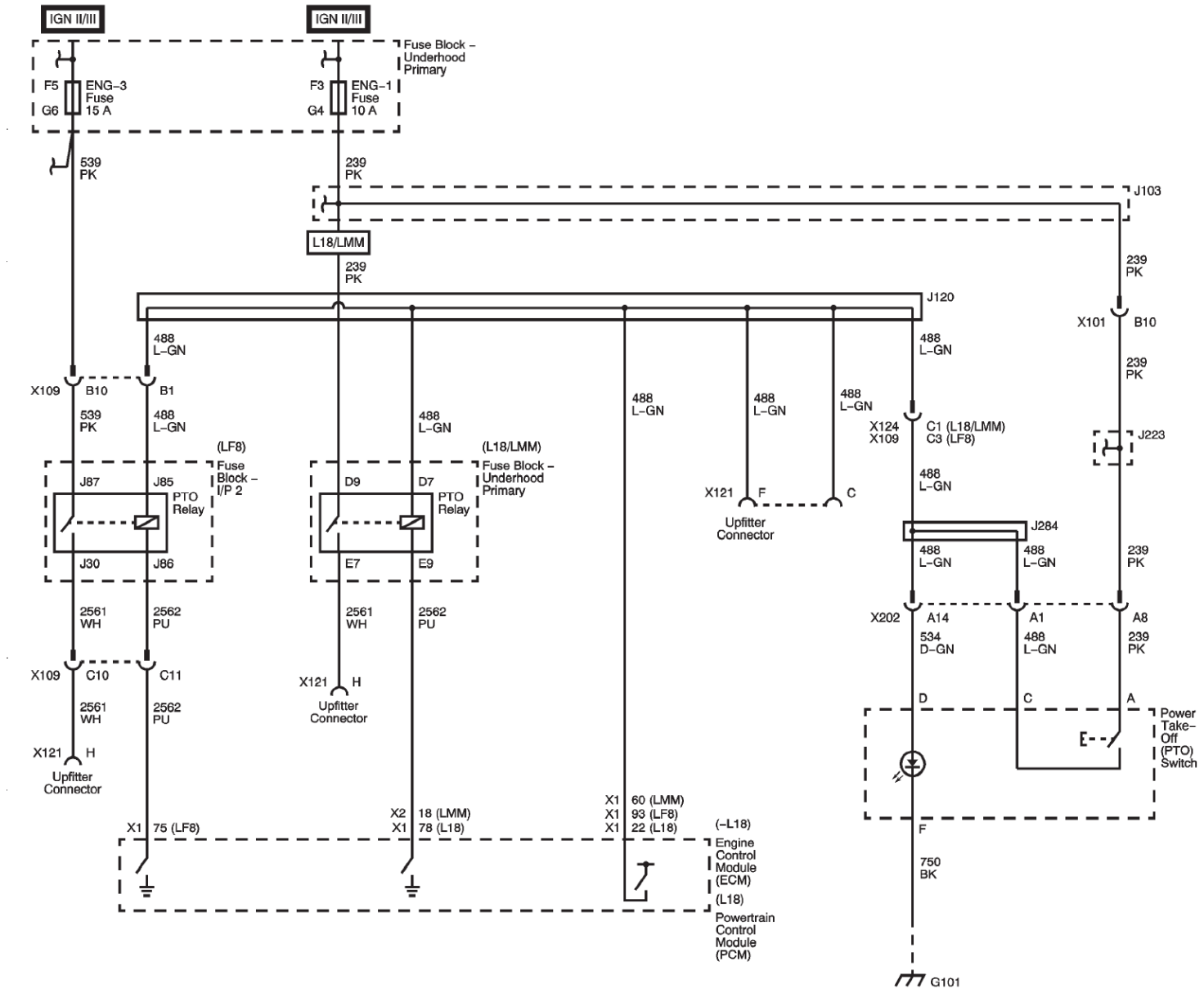
(continued on next page)

Power Take-Off (PTO)/Diagnostic Checks – PTO Indicator Inoperative (continued)

Schematic Reference: **Power take-off (PTO) Schematics** *(continued)*			
Step	**Action**	**Yes**	**No**
3	Does the PTO solenoid engage?	Go to Step 4	Go to Power Take-Off (PTO) Does Not Engage
4	1. Turn the ignition switch to RUN. 2. Turn the PTO enable switch to ON. 3. Ensure that the conditions for engaging the PTO solenoid are met. Refer to Power Take-Off (PTO) Description and Operation. 4. Remove the PTO switch, but leave it connected to the harness. 5. Using a test lamp test for voltage at the PTO On Switch Signal circuit at the switch. *Does the test lamp illuminate?*	Go to Step 5	Go to Step 6
5	1. Turn the PTO enable switch to OFF. 2. Turn the ignition switch OFF. 3. Disconnect the switch. 4. Using a DMM test for continuity on the ground circuit at the switch connector. *Do you have continuity?*	Go to Step 8	Go to Step 7

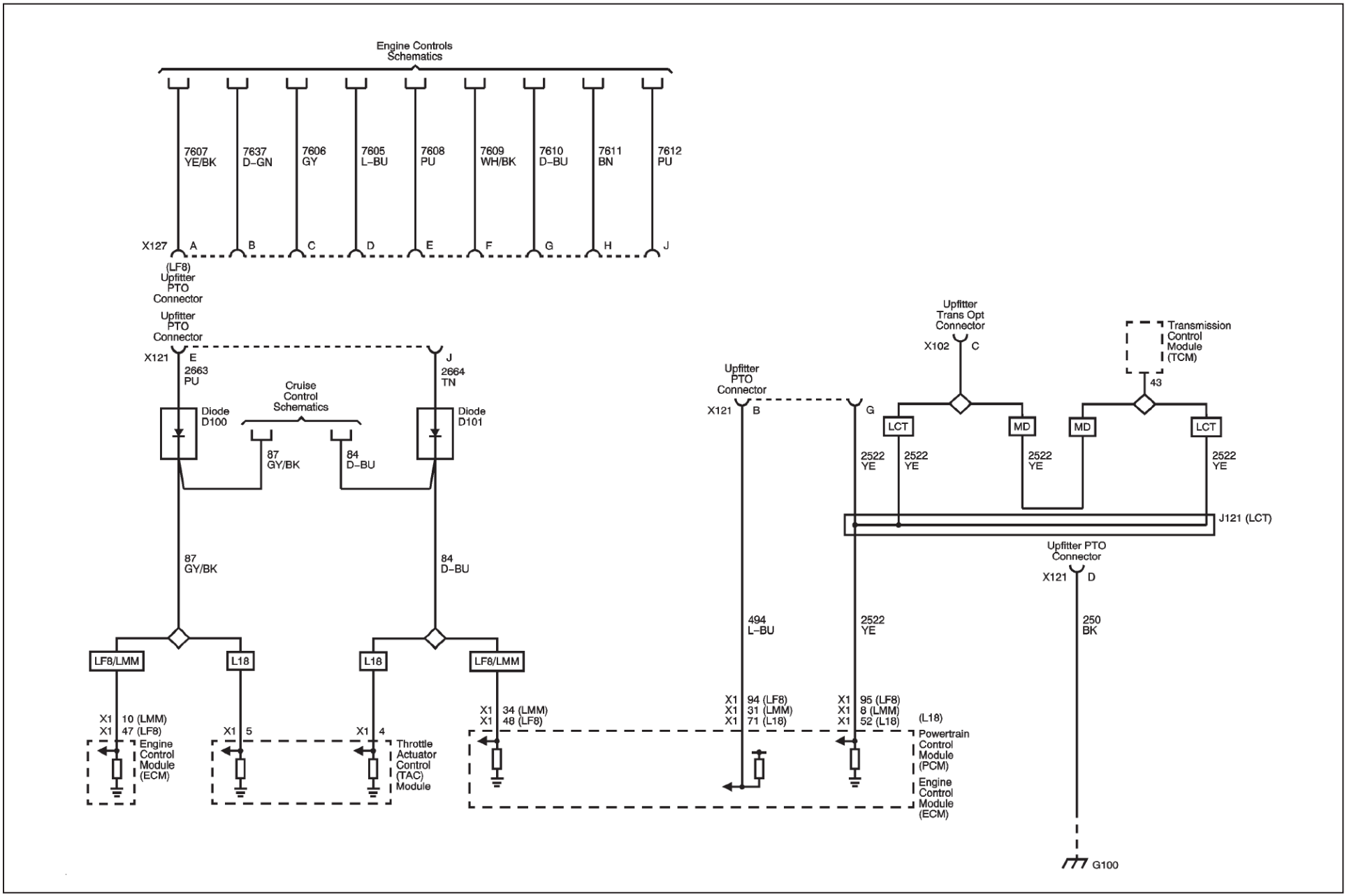
Schematic Reference: **Power take-off (PTO) Schematics** *(continued)*			
Step	**Action**	**Yes**	**No**
6	Repair the open or high resistance in both PTO On switch Signal circuit. Refer to Wiring Repairs. *Did you complete the repair?*	Go to Step 9	--
7	Repair the open or high resistance in the ground circuit. Refer to Wiring Repairs. *Did you complete the repair?*	Go to Step 9	--
8	Replace the PTO Enable switch. Refer to Upfitters instructions. *Did you complete the replacement?*	Go to Step 9	--
9	Test drive the vehicle and operate the PTO system as described in the supporting test. *Does the symptom occur?*	Go to Step 3	System OK

Power Take-Off (PTO)/Schematics – L18, LMM, LF8 (1 of 2)

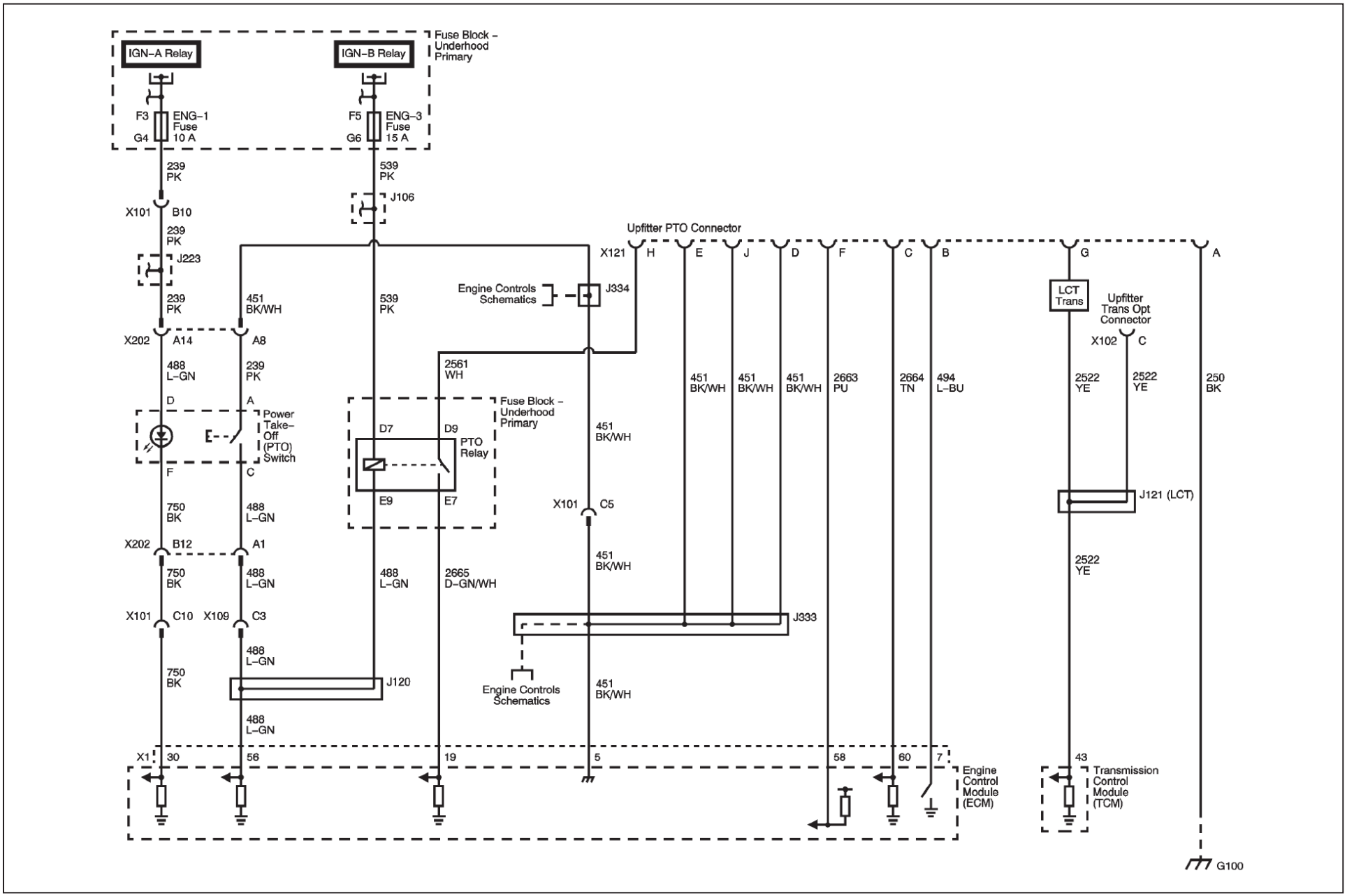


(continued on next page)

Power Take-Off (PTO)/Schematics – L18, LMM, LF8 (2 of 2)



Power Take-Off (PTO)/Schematics – LF6



Vehicle – Diagnostic System Check

1. Before beginning vehicle diagnosis, the following preliminary inspections/tests must be performed:
   - Ensure that the battery is fully charged. Refer to Battery Inspection/Test.
   - Ensure that the battery cables are clean and tight.
   - Inspect for any open fuses. Refer to Power Distribution Schematics and Electrical Center Identification Views.
   - Ensure that the grounds are clean, tight, and in the correct location. Refer to Ground Distribution Schematics and Harness Routing Views.
   - Inspect the easily accessible systems or the visible system components for obvious damage or conditions that could cause the concern. This would include checking to ensure that all connections/connectors are fully seated and secured.
   - Inspect for aftermarket devices that could affect the operation of the system. Refer to Checking Aftermarket Accessories.
   - Search for applicable service bulletins.

If the preceding inspections/tests resolve the concern, go to Diagnostic Repair Verification.

9. Install a scan tool. Verify that the scan tool powers up.

If the scan tool does not power up, refer to Scan Tool Does Not Power Up.

10. Ignition ON, Engine OFF, verify communication with all of the control modules on the vehicle. Refer to Data Link References for information on the modules you should expect to communicate.

If the scan tool does not communicate with one or more of the expected control modules, refer to Data Link References.

11. Attempt to start the engine. Verify that the engine cranks.

If the engine does not crank, refer to Symptoms - Engine Electrical.

12. **Important:** For the 7.2L Caterpillar engine, refer to the appropriate Caterpillar Service Manual.

13. Attempt to start the engine. Verify the engine starts and idles.

If the engine does not start and idle, refer to one of the following:

- Engine Cranks but Does Not Run for the 6.6L (LMM) engine
- Engine Cranks but Does Not Run for the 7.8L (LF8) engine
- Engine Cranks but Does Not Run for the 8.1L engine

17. **Important:** For the 7.2L Caterpillar engine, refer to the appropriate Caterpillar Service Manual.

18. **Important:** Do not clear any DTCs unless instructed to do so by a diagnostic procedure.

(continued on next page)

Vehicle – Diagnostic System Check (continued)

19. **Important:** If any DTCs are Powertrain related DTCs, select Capture Info in order to store the DTC information with the scan tool.
20. Use the appropriate scan tool selections to obtain DTCs from each of the vehicle modules. Verify there are no DTCs reported from any module.

If any DTCs are present, refer to Diagnostic Trouble Code (DTC) List - Vehicle and diagnose any current DTCs in the following order:

6.1. DTCs that begin with a U.

6.2. Any of the following: B1000, B1001, C0550, P0601, P0602, P0603, P0604, P0605, P0606, P060B, P061C, P062C, P062F, P064C, P160C, P1621, P2108, or P2610.

6.3. Any of the following: C0899, C0900, P0562, or P0563.

6.4. Component level DTCs.

6.5. System level DTCs.

6.6. Any remaining DTCs.

27. If none of the previous tests or inspections addresses the concern, refer to Symptoms - Vehicle.

Checking Aftermarket Accessories

Do not connect aftermarket accessories into the following circuits:

Caution: Refer to SIR Caution in the Preface section.

- SIR circuits, all such circuits are indicated on circuit diagrams with the SIR symbol.

Notice: The OBD II symbol is used on the circuit diagrams in order to alert the technician that the circuit is essential for proper OBD II emission control circuit operation. Any circuit which fails and causes the malfunction indicator lamp (MIL) to turn ON, or causes emissions-related component damage, is identified as an OBD II circuit.

- OBD II circuits, all such circuits are indicated on circuit diagrams with the OBD II symbol.

Always check for aftermarket accessories (non-OEM) as the first step in diagnosing electrical problems. If the vehicle is so equipped, disconnect the system to verify that these add-on accessories are not the cause of the problems.

Possible causes of vehicle problems related to aftermarket accessories include:

- Power feeds connected to points other than the battery
- Antenna location
- Transceiver wiring located too close to vehicle electronic modules or wiring
- Poor shielding or poor connectors on antenna feed line
- Check for recent service bulletins detailing installation guidelines for aftermarket accessories.

Wiring Repairs/Testing for Intermittent Conditions and Poor Connections

Tools Required

- J 35616 GM-Approved Terminal Test Kit
- J-38125 Terminal Repair Kit

When the condition is not currently present, but is indicated in DTC history, the cause may be intermittent. An intermittent may also be the cause when there is a customer complaint, but the symptom cannot be duplicated. Refer to the Symptom Table of the system that is suspect of causing the condition before trying to locate an intermittent condition.

Most intermittent conditions are caused by faulty electrical connections or wiring. Inspect for the following items:

- Wiring broken inside the insulation
- Poor connection between the male and female terminal at a connector
- Poor terminal to wire connection--Some conditions which fall under this description are poor crimps, poor solder joints, crimping over the wire insulation rather than the wire itself, and corrosion in the wire to terminal contact area, etc.
- Pierced or damaged insulation can allow moisture to enter the wiring causing corrosion. The conductor can corrode inside the insulation, with little visible evidence. Look for swollen and stiff sections of wire in the suspect circuits.
- Wiring which has been pinched, cut, or its insulation rubbed through may cause an intermittent open or short as the bare area touches other wiring or parts of the vehicle.
- Wiring that comes in contact with hot or exhaust components
- Refer to Inducing Intermittent Fault Conditions in order to duplicate the conditions required, in order to verify the customer concern.
- Refer to Testing for Electrical Intermittents for test procedures to detect intermittent open, high resistance, short to ground, and short to voltage conditions.
- Refer to Scan Tool Snapshot Procedure for advanced intermittent diagnosis and Vehicle Data Recorder operation.

Testing for Proper Terminal Contact

It is important to test terminal contact at the component and any inline connectors before replacing a suspect component. Mating terminals must be inspected to ensure good terminal contact. A poor connection between the male and female terminal at a connector may be the result of contamination or deformation.

Contamination may be caused by the connector halves being improperly connected. A missing or damaged connector seal, damage to the connector itself, or exposing the terminals to moisture and dirt can also cause contamination. Contamination, usually in the underhood or underbody connectors, leads to terminal corrosion, causing an open circuit or intermittently open circuit.

(continued on next page)

Wiring Repairs/Testing for Intermittent Conditions and Poor Connections (continued)

Testing for Proper Terminal Contact *(continued)*

Deformation is caused by probing the mating side of a connector terminal without the proper adapter. Always use the J 35616 when probing connectors. Other causes of terminal deformation are improperly joining the connector halves, or repeatedly separating and joining the connector halves. Deformation, usually to the female terminal contact tang, can result in poor terminal contact causing an open or intermittently open circuit.

Testing for Proper Terminal Contact in Bussed Electrical Centers (BEC)

It is very important to use the correct test adapter when testing for proper terminal contact of fuses and relays in a bussed electrical center (BEC). Use J-35616-35 to test for proper terminal contact. Failure to use J-35616-35 can result in improper diagnosis of the BEC.

Follow the procedure below in order to test terminal contact:

1. Separate the connector halves.
2. Visually inspect the connector halves for contamination. Contamination may result in a white or green build-up within the connector body or between terminals. This causes high terminal resistance, intermittent contact, or an open circuit. An underhood or underbody connector that shows signs of contamination should be replaced in its entirety: terminals, seals, and connector body.
3. Using an equivalent male terminal from the J-38125, test that the retention force is significantly different between a good terminal and a suspect terminal. Replace the female terminal in question.

Flat Wire (Dock and Lock) Connectors

There are no serviceable parts for flat wire (dock and lock) connectors on the harness side or the component side.

Follow the procedure below in order to test terminal contact:

1. Remove the component in question.
2. Visually inspect each side of the connector for signs of contamination. Avoid touching either side of the connector as oil from your skin may be a source of contamination as well.
3. Visually inspect the terminal bearing surfaces of the flat wire circuits for splits, cracks, or other imperfections that could cause poor terminal contact. Visually inspect the component side connector to ensure that all of the terminals are uniform and free of damage or deformation.
4. Insert the appropriate adapter from the on the flat wire harness connector in order to test the circuit in question.

Control Module/Component Voltage and Grounds

Poor voltage or ground connections can cause widely varying symptoms.

- Test all control module voltage supply circuits. Many vehicles have multiple circuits supplying voltage to a control module. Other components in the system may have separate voltage supply circuits that may also need to be tested. Inspect connections at the module/component connectors, fuses, and any intermediate connections between the voltage source and the module/component. A test lamp or a DMM may indicate that voltage is present, but neither tests the ability of the circuit to carry sufficient current.

(continued on next page)

Wiring Repairs/Testing for Intermittent Conditions and Poor Connections (continued)

Ensure that the circuit can carry the current necessary to operate the component. Refer to Circuit Testing and Power Distribution Schematics.

- Test all control module ground and system ground circuits. The control module may have multiple ground circuits. Other components in the system may have separate grounds that may also need to be tested. Inspect grounds for clean and tight connections at the grounding point. Inspect the connections at the component and in splice packs, where applicable. Ensure that the circuit can carry the current necessary to operate the component. Refer to Circuit Testing and Ground Distribution Schematics.

Temperature Sensitivity

- An intermittent condition may occur when a component/connection reaches normal operating temperature. The condition may occur only when the component/connection is cold, or only when the component/connection is hot.
- Freeze Frame, Failure Records, Snapshot, or Vehicle Data Recorder data may help with this type of intermittent condition, where applicable.
- If the intermittent is related to heat, review the data for a relationship with the following:
  - High ambient temperatures
  - Underhood/engine generated heat
  - Circuit generated heat due to a poor connection, or high electrical load
  - Higher than normal load conditions, towing, etc.
- If the intermittent is related to cold, review the data for the following:
  - Low ambient temperatures--In extremely low temperatures, ice may form in a connection or component. Inspect for water intrusion.
  - The condition only occurs on a cold start.
  - The condition goes away when the vehicle warms up.
- Information from the customer may help to determine if the trouble follows a pattern that is temperature related.
- If temperature is suspected of causing an intermittent fault condition, attempt to duplicate the condition. Refer to Inducing Intermittent Fault Conditions in order to duplicate the conditions required.

Electromagnetic Interference (EMI) and Electrical Noise

Some electrical components/circuits are sensitive to electromagnetic interference (EMI) or other types of electrical noise. Inspect for the following conditions:

- A misrouted harness that is too close to high voltage/high current devices such as secondary ignition components, motors, generator etc--These components may induce electrical noise on a circuit that could interfere with normal circuit operation.
- Electrical system interference caused by a malfunctioning relay, or a control module driven solenoid or switch – These conditions can cause a sharp electrical surge. Normally, the condition will occur when the malfunctioning component is operating.

(continued on next page)

Wiring Repairs/Testing for Intermittent Conditions and Poor Connections (continued)

- Improper installation of non-factory or aftermarket add on accessories such as lights, 2-way radios, amplifiers, electric motors, remote starters, alarm systems, cell phones, etc- -These accessories may lead to interference while in use, but do not fail when the accessories are not in use. Refer to Checking Aftermarket Accessories.
- Test for an open diode across the A/C compressor clutch and for other open diodes. Some relays may contain a clamping diode.
- The generator may be allowing AC noise into the electrical system.

Incorrect Control Module

- There are only a few situations where reprogramming a control module is appropriate:
  - A new service control module is installed.
  - A control module from another vehicle is installed.
  - Revised software/calibration files have been released for this vehicle.

Important: DO NOT re-program the control module with the SAME software/calibration files that are already present in the control module. This is not an effective repair for any type of concern.

- Verify that the control module contains the correct software/calibration. If incorrect programming is found, reprogram the control module with the most current software/calibration. Refer to Control Module References for replacement, setup, and programming.

Wiring Repairs/Flat Wire Repairs

Notice: The flat wire within the flex wiring harness is not serviceable. If an open or short exists within the flex wiring harness the complete harness must be replaced.

Wiring Repairs/GMLAN Wiring Repairs

Tools Required

J-38125 Terminal Repair Kit

The GM Local Area Network (GMLAN) System requires special wiring repair procedures due to the sensitive nature of the circuitry. Follow the specific procedures and instructions when working on GMLAN connectors and terminals.

The tool kit J-38125 contains the following items in order to repair the GMLAN wiring:

- DuraSeal splice sleeves
- A wire stripping tool
- J 38125-8 Crimping Tool (GM P/N 12085115)
- J 38125-5 Ultra Torch Special Tool (GM P/N 12085116)

The DuraSeal splice sleeves have the following 2 critical features:

- A special heat shrink sleeve environmentally seals the splice. The heat shrink sleeve contains a sealing adhesive inside.
- A cross hatched (knurled) core crimp provides necessary contact integrity for the sensitive, low energy circuits.

The J-38125 also serves as a generic terminal repair kit. The kit contains the following items:

- A large sampling of common electrical terminals
- The correct tools in order to attach the terminals to the wires
- The correct tools in order to remove the terminals from the connectors

GMLAN Repairs

Important: When making a repair to any GMLAN network, the original wire length after the repair must be the same length as before the repair. If the network is a twisted pair, the twist must be maintained after the repair is completed.

GMLAN has 2 types of networks, low speed and high speed. Low speed GMLAN has a single wire and works at slow speeds. High speed GMLAN has 2 wires in a twisted pair and works at higher speeds. For more information on GMLAN, refer to Data Link Communications Description and Operation.

GMLAN Connector Terminal Repair

Important: A service terminal can be used to replace damaged connector terminals for both high speed and low speed GMLAN systems. When making a connector terminal repair on a GMLAN high speed system with twisted pair wires, do not untwist the wires more than necessary to make the repair.

The terminals in the GMLAN system are made of a special metal. This metal provides the necessary contact integrity for the sensitive, low energy circuits. These terminals are available in the J-38125. If the individual terminals are damaged on any GMLAN connection, use the appropriate connector repair procedure in order to repair the terminal. Refer to Connector Repairs for the appropriate connector repair procedure.

(continued on next page)

Wiring Repairs/GMLAN Wiring Repairs (continued)

GMLAN Wire Repair

Important: Refer to Wiring Repairs in order to determine the correct wire size for the circuit you are repairing. You must obtain this information in order to ensure circuit integrity.

If a wire is damaged, repair the wire by splicing in a new section of wire of the same gage size (0.5 mm, 0.8 mm, 1.0 mm, etc.). Use the DuraSeal splice sleeves and splice crimping tool from the J-38125. Use the following wiring repair procedures in order to ensure the integrity of the sealed splice.

Splice Sleeve Color	Crimp Tool Nest Color	Wire Gage mm^2/ (AWG)
Salmon (Yellow-Pink) 12089189	Red (1)	0.035-0.8/(18-20)
Blue 12089190	Blue (2)	1.0-2.0/(14-16)
Yellow 12089191	Yellow (3)	3.0-5.0/(10-12)
Green 88988379	Red (1)	0.22-0.35/(22-24)

Important: You must perform the following procedures in the listed order. Repeat the procedure if any wire strands are damaged. You must obtain a clean strip with all of the wire strands intact.

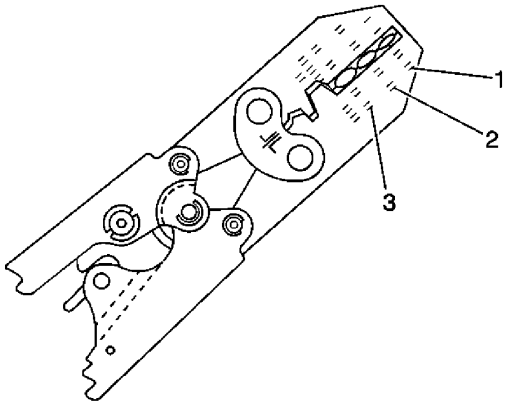
1. Open the harness by removing any tape:
   - Use a sewing seam ripper (available from sewing supply stores) in order to cut open the harness in order to avoid wire insulation damage.
   - Use the DuraSeal splice sleeves on all types of insulation except coaxial.
   - Do not use the DuraSeal splice sleeve to form a splice with more than 2 wires coming together.
4. Cut as little wire off the harness as possible. You may need the extra length of wire in order to change the location of a splice.

   Adjust splice locations so that each splice is at least 40 mm (1.5 in) away from the other splices, harness branches, or connectors.
5. Strip the insulation:
   - When adding a length of wire to the existing harness, use the same size wire as the original wire.
   - Perform one of the following items in order to find the correct wire size:
     - Find the wire on the schematic and convert the metric size to the equivalent American wire gage (AWG) size.
     - Use an AWG wire gage.
     - If you are unsure of the wire size, begin with the largest opening in the wire stripper and work down until achieving a clean strip of the insulation.
   - Strip approximately 7.5 mm (0.313 in) of insulation from each wire to be spliced.
   - Do not nick or cut any of the strands. Inspect the stripped wire for nicks or cut strands.
   - If the wire is damaged, repeat this procedure after removing the damaged section.

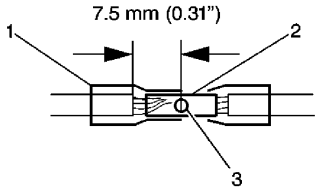
(continued on next page)

Wiring Repairs/GMLAN Wiring Repairs (continued)

13. Select the proper DuraSeal splice sleeve according to the wire size. Refer to the above table at the beginning of the repair procedure for the color coding of the DuraSeal splice sleeves and the crimp tool nests.



14. Use the Splice Crimp Tool from the J-38125 in order to position the DuraSeal splice sleeve in the proper color nest of the Splice Crimp Tool. The crimp tool has three nests, 1 is for the salmon and green splice sleeve, 2 is for the blue splice sleeve, and 3 is for the yellow splice sleeve.



15. Place the DuraSeal splice sleeve in the nest. Ensure that the crimp falls midway between the end of the barrel and the stop. The sleeve has a stop (3) in the middle of the barrel (2) in order to prevent the wire (1) from going further. Close the hand crimper handles slightly in order to firmly hold the DuraSeal splice sleeve in the proper nest.

16. Insert the wire into the splice sleeve barrel until the wire hits the barrel stop.
17. Tightly close the handles of the crimp tool until the crimper handles open when released.

    The crimper handles will not open until you apply the proper amount of pressure to the splice sleeve. Repeat steps 4 and 5 for the opposite end of the splice.

18. Using the heat torch, apply heat to the crimped area of the barrel.
19. Start in the middle and gradually move the heat barrel to the open ends of the tubing:
    - The tubing will shrink completely as the heat is moved along the insulation.
    - A small amount of sealant will come out of the end of the tubing when sufficient shrinkage is achieved.

Wiring Repairs/High Temperature Wiring Repairs

Tools Required

J-38125 Terminal Repair Kit

High Temperature Wiring

Wiring that is exposed to high temperatures, 135°C (275°F) or higher, for prolonged periods of time may use materials i.e. wires, connectors, and shielding that has a higher heat rating than typical wiring. When making a repair in a high temperature area observe the following:

- Use high temperature bulk wire rated at 150°C (302°F) continuous temperature to replace any damaged wire.
- Replace any heat shielding that is removed.
- Cover any DuraSeal splice sleeves with SCT1 shrink tubing (available in the J-38125 Terminal Repair kit).
- After making a wiring repair, ensure that the location of the wiring is not moved closer to the heat source.

Identifying High Temperature Wiring

Wiring that is exposed to high temperature, 135°C (275°F) or higher, for prolonged periods of time need special considerations when making wiring repairs. Areas that may be exposed to higher temperatures can be identified by heat resistant materials that are being used in those areas. These materials may include heat reflective tape, moon tape, and high temperature shrink tubing. Also conduit and other protective coverings may be used. Because conduit or similar coverings are used throughout the vehicle regardless of the temperature, it may be necessary for the technician to determine if an area is exposed to excessive heat before making a wiring repair. Obvious areas of consideration would be any area located near the exhaust manifolds, catalytic converter, and exhaust pipes.

The J-38125 contains much of the material you will need to perform repairs on areas exposed to high heat. The kit contains the following items:

- DuraSeal splice sleeves to crimp and seal connections
- High temperature SCT1 shrink tubing to protect the splice sleeves
- A large sampling of common electrical terminals
- The correct crimp tool to attach the terminals to the wires
- The correct tools to remove the terminals from the connectors

The J-38125 does not contain wire that is suitable to high temperature exposure. Use high temperature bulk wire rated at 150°C (302°F) continuous temperature of the same or larger gage size as the original wire when repair damage wire. Also replace any reflective tape that you remove during the repair.

High Temperature Wire Repair

Important: Refer to Wiring Repairs in order to determine the correct wire size for the circuit you are repairing. You must obtain this information in order to ensure circuit integrity.

If any wire except the pigtail is damaged, repair the wire by splicing in a new section of wire rated at 150°C (302°F) continuous temperature rating of the same gage size (0.5 mm, 0.8 mm, 1.0 mm etc.).

(continued on next page)

Wiring Repairs/High Temperature Wiring Repairs (continued)

Use the DuraSeal splice sleeves and splice crimping tool from the J-38125 and then encapsulate the splice sleeve using the high temperature SCT1 shrink tubing. Use the following wiring repair procedures in order to ensure the integrity of the sealed splice.

Splice Sleeve Color	Crimp Tool Nest Color	Wire Gage mm²/ (AWG)
Salmon (Yellow-Pink) 12089189	Red (1)	0.035-0.8/(18-20)
Blue 12089190	Blue (2)	1.0-2.0/(14-16)
Yellow 12089191	Yellow (3)	3.0-5.0/(10-12)
Green 88988379	Red (1)	0.22-0.35/(22-24)

Important: You must perform the following procedures in the order listed. Repeat the procedure if any wire strands are damaged. You must obtain a clean strip keeping all of the wire strands intact.

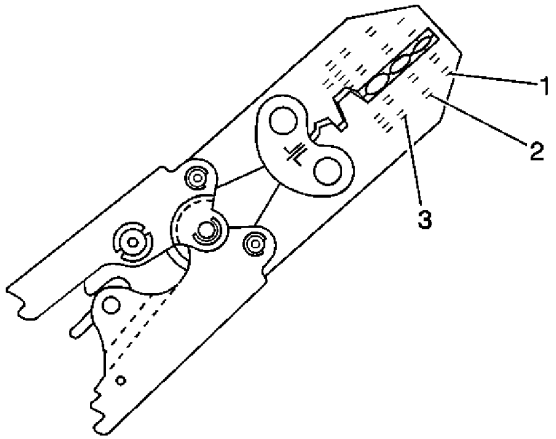
1. Open the harness by removing any tape.
2. Use a sewing seam ripper, available from sewing supply stores, in order to cut open the harness in order to avoid wire insulation damage.
3. Cut as little wire off the harness as possible. You may need the extra length of wire in order to change the location of a splice.

   Adjust splice locations so that each splice is at least 40 mm (1.5 in) away from the other splices, harness branches, or connectors.
4. Strip the insulation:
   - When adding a length of wire to the existing harness, use the same size wire as the original wire.
   - Perform one of the following items in order to find the correct wire size:
     - Find the wire on the schematic and convert the metric size to the equivalent american wire gage (AWG) size.
     - Use an AWG wire gage.
     - If you are unsure of the wire size, begin with the largest opening in the wire stripper and work down until achieving a clean strip of the insulation.
   - Strip approximately 7.5 mm (0.313 in) of insulation from each wire to be spliced.
   - Do not nick or cut any of the strands. Inspect the stripped wire for nicks or cut strands.
   - If the wire is damaged, repeat this procedure after removing the damaged section.

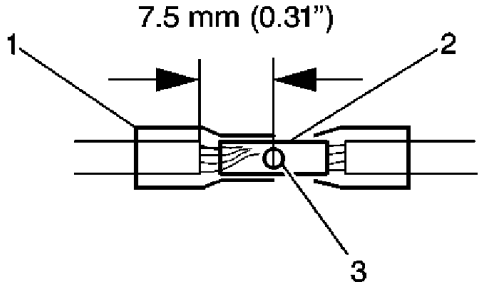
12. Slide a section of high temperature SCT1 shrink tubing down the length of wire to be spliced. Ensure that the shrink tubing will not interfere with the splice procedure.
13. Select the proper DuraSeal splice sleeve according to the wire size. Refer to the above table at the beginning of the repair procedure for the color coding of the DuraSeal splice sleeves and the crimp tool nests.

(continued on next page)

Wiring Repairs/High Temperature Wiring Repairs (continued)



14. Use the Splice Crimp Tool from the J-38125 in order to position the DuraSeal splice sleeve in the proper color nest of the Splice Crimp Tool. The crimp tool has three nests, 1 is for the salmon and green splice sleeve, 2 is for the blue splice sleeve, and 3 is for the yellow splice sleeve.



15. Place the DuraSeal splice sleeve in the nest. Ensure that the crimp falls midway between the end of the barrel and the stop. The sleeve has a stop (3) in the middle of the barrel (2) in order to prevent the wire (1) from going further. Close the hand crimper handles slightly in order to firmly hold the DuraSeal splice sleeve in the proper nest.

16. Insert the wire into the DuraSeal splice sleeve barrel until the wire hits the barrel stop.
17. Tightly close the handles of the crimp tool until the crimper handles open when released.

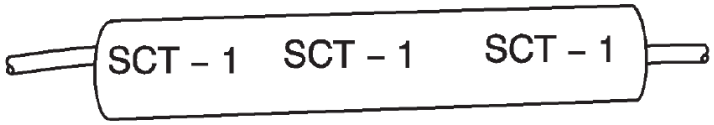
    The crimper handles will not open until you apply the proper amount of pressure to the splice sleeve. Repeat steps 4 and 5 for the opposite end of the splice.

18. Using the heat torch, apply heat to the crimped area of the barrel.
19. Gradually move the heat barrel to the open end of the tubing:
    - The tubing will shrink completely as the heat is moved along the insulation.
    - A small amount of sealant will come out of the end of the tubing when sufficient shrinkage is achieved.

(continued on next page)

Wiring Repairs/High Temperature Wiring Repairs (continued)

21.



22. Center the high temperature SCT1 shrink tube over the DuraSeal splice sleeve.
23. Using the heat torch, apply heat to the high temperature heat shrink tubing.
24. Gradually move the heat from the center to the open end of the tubing:
    - The tubing will shrink completely as the heat is moved along the insulation.
    - A small amount of sealant will come out of the end of the tubing when sufficient shrinkage is achieved.
26. Replace any reflective tape and clips that may have been removed during the repair.

Wiring Repairs/Heated Oxygen Sensor Wiring Repairs

Tools Required

J-38125 Terminal Repair Kit

Notice: Do not solder repairs under any circumstances as this could result in the air reference being obstructed.

If the heated oxygen sensor pigtail wiring, connector, or terminal is damaged the entire oxygen sensor assembly must be replaced. Do not attempt to repair the wiring, connector, or terminals. In order for the sensor to function properly it must have a clean air reference. This clean air reference is obtained by way of the oxygen sensor signal and heater wires. Any attempt to repair the wires, connectors or terminals could result in the obstruction of the air reference and degrade oxygen sensor performance.

The following guidelines should be used when servicing the heated oxygen sensor:

- Do not apply contact cleaner or other materials to the sensor or vehicle harness connectors. These materials may get into the sensor, causing poor performance. Also, the sensor pigtail and harness wires must not be damaged in such a way that the wires inside are exposed. This could provide a path for foreign materials to enter the sensor and cause performance problems.
- Neither the sensor nor vehicle lead wires should be bent sharply or kinked. Sharp bends, kinks, etc., could block the reference air path through the lead wire.
- Do not remove or defeat the oxygen sensor ground wire (where applicable). Vehicles that utilize the ground wire sensor may rely on this ground as the only ground contact to the sensor. Removal of the ground wire will also cause poor engine performance.
- To prevent damage due to water intrusion, be sure that the peripheral seal remains intact on the vehicle harness connector.

The engine harness may be repaired using the J-38125.

Wiring Repairs/Splicing Copper Wire Using Splice Clips

Important: When making a splice in an area that may be exposed to moisture use a crimp and seal splice sleeve instead of a Splice Clip. Refer to Splicing Copper Wire Using Splice Sleeves.

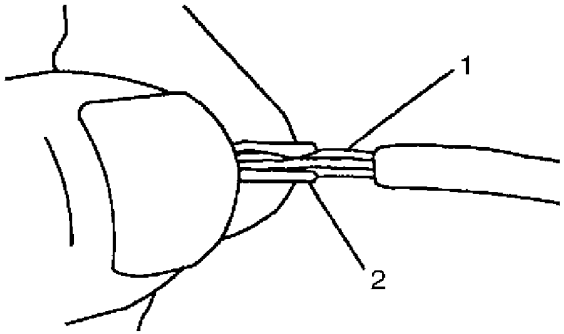
Tools Required

J-38125 Terminal Repair Kit

1. Open the harness.
   - If the harness is taped, remove the tape.
   - To avoid wiring insulation damage, use a sewing ripper in order to cut open the harness.
   - If the harness has a black plastic conduit, pull out the desired wire.
4. Cut the wire.
   - Cut as little wire off the harness as possible.
   - Ensure that each splice is at least 40 mm (1.5 in) away from other splices, harness branches and connectors. This helps prevent moisture from bridging adjacent splices and causing damage.
6. Select the proper size and type of wire.
   - The wire must be of equal or greater size than the original (except fusible link).
   - The wire insulation must have the same or higher temperature rating.
     - Use general purpose insulation for areas that are not subject to high temperatures.
     - Use a cross-linked polyethylene insulated wire for areas where high temperatures are expected.

Important: Use cross-linked polyethylene wire to replace PVC, but do not replace cross-linked polyethylene with PVC.

11. Strip the insulation.
    - Select the correct size opening in the wire stripper or work down from the largest size.
    - Strip approximately 7.5 mm (5/16 in) of insulation from each wire to be spliced.
13. Select the proper clip to secure the splice. Follow the instructions in the J-38125 in order to determine the proper clip size crimp tool and anvil.
14. Overlap the 2 stripped wire ends and hold them between thumb and forefinger.

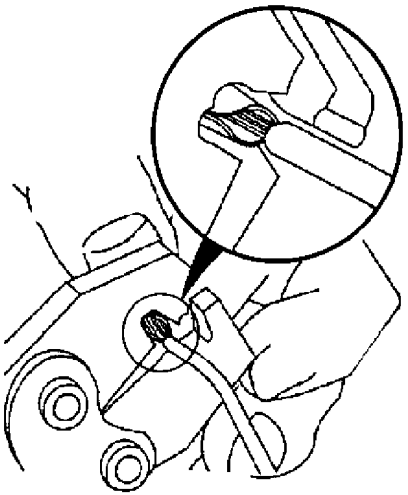


15. Center the splice clip (2) over the stripped wires (1) and hold the clip in place.
    - Ensure that the wires extend beyond the clip in each direction.
    - Ensure that no insulation is caught under the clip.

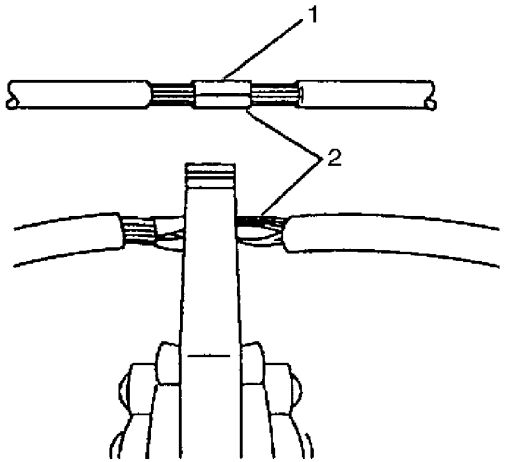
(continued on next page)

Wiring Repairs/Splicing Copper Wire Using Splice Clips (continued)

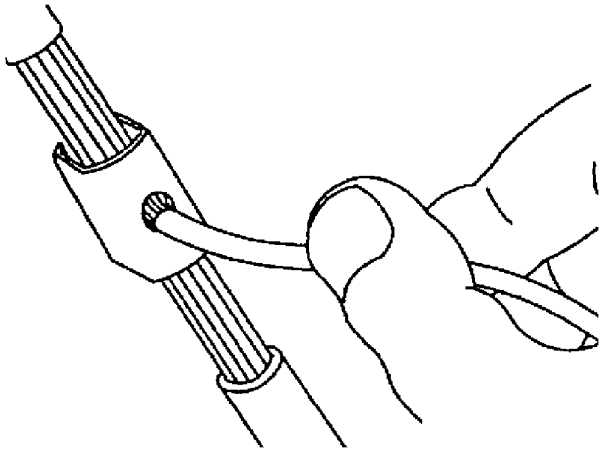
17.



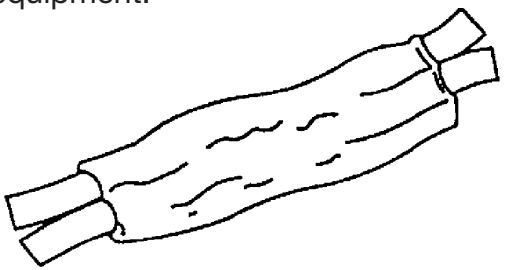
18. Center the crimp tool over the splice clip and wires.
19. Apply steady pressure until the crimp tool closes. Ensure that no strands of wire are cut.



20. Crimp the splice on each end (2).



21. Apply 60/40 rosin core solder to the opening in the back of the clip. Follow the manufacturer's instructions for the solder equipment.



22. Tape the splice. Roll on enough tape in order to duplicate the thickness of the insulation on the existing wires.

23. Additional tape can be applied to the wire if the wire does not belong in a conduit or another harness covering. Use a winding motion in order to cover the first piece of tape.

Wiring Repairs/Splicing Copper Wire Using Splice Sleeves

Tools Required

J-38125 Terminal Repair Kit

Important: Use only DuraSeal splice sleeves. Other splice sleeves may not protect the splice from moisture or provide a good electrical connection.

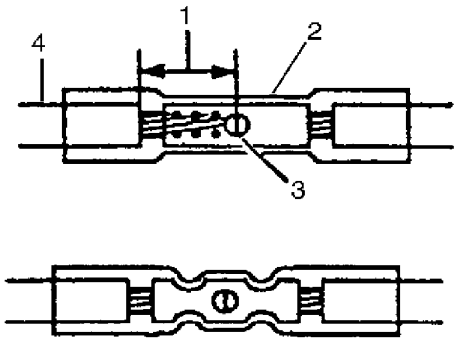
Use DuraSeal splice sleeves to form a one-to-one splice on all types of insulation except tefzel and coaxial. Use DuraSeal splice sleeves where there is special requirements such as moisture sealing. Follow the instructions below in order to splice copper wire using DuraSeal splice sleeves.

Splice Sleeve Color	Crimp Tool Nest Color	Wire Gage mm^2/ (AWG)
Salmon (Yellow-Pink) 12089189	Red (1)	0.035-0.8/(18-20)
Blue 12089190	Blue (2)	1.0-2.0/(14-16)
Yellow 12089191	Yellow (3)	3.0-5.0/(10-12)
Green 88988379	Red (1)	0.22-0.35/(22-24)

1. Open the harness.
   - If the harness is taped, remove the tape.
   - To avoid wiring insulation damage, use a sewing ripper in order to cut open the harness.
   - If the harness has a black plastic conduit, pull out the desired wire.

4. Cut the wire.
   - Cut as little wire off the harness as possible.
   - Ensure that each splice is at least 40 mm (1.5 in) away from other splices, harness branches, and connectors. This helps prevent moisture from bridging adjacent splices and causing damage.

6.



7. Select the proper size and type of wire.
   - The wire must be of equal or greater size than the original.
   - The wires insulation must have the same or higher temperature rating (4).
     - Use general purpose insulation for areas that are not subject to high temperatures.
     - Use a cross-linked polyethylene insulated wire for areas where high temperatures are expected.

Important: Use cross-linked polyethylene wire to replace PVC, but do not replace cross-linked polyethylene with PVC.

Cross-linked polyethylene wire is not fuel resistant. Do not use to replace wire where there is the possibility of fuel contact.

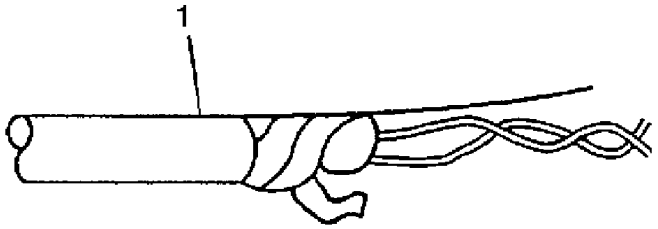
(continued on next page)

Wiring Repairs/Splicing Copper Wire Using Splice Sleeves (continued)

12. Strip the insulation.
    - Select the correct size opening in the wire stripper or work down from the largest size.
    - Strip approximately 7.5 mm (5/16 in) of insulation from each wire to be spliced (1).
14. Select the proper DuraSeal splice sleeve (2) and the required crimp nest tool. Refer to the Crimp and Seal Splice Table.
15. Place the DuraSeal splice sleeve in the J-38125-8 (GM P/N 12085115) crimp tool nest so that the crimp falls at point 1 on the splice.
16. Close the hand crimper handles slightly in order to hold the DuraSeal splice sleeve firmly in the proper crimp tool nest.
17. Insert the wires into the DuraSeal splice sleeve until the wire hits the barrel stop. The splice sleeve has a stop in the middle of the barrel in order to prevent the wire from passing through the splice (3).
18. Close the handles of the J-38125-8 (GM P/N 12085115), until the crimper handles open when released. The crimper handles will not open until the proper amount of pressure is applied to the splice sleeve.
19. Shrink the insulation around the splice.
    - Using the heat torch, apply heat to the crimped area of the barrel.
    - Gradually move the heat barrel to the open end of the tubing.
      - The tubing will shrink completely as the heat is moved along the insulation.
      - A small amount of sealant will come out of the end of the tubing when sufficient shrinkage is achieved.

Wiring Repairs/Splicing Twisted or Shielded Cable

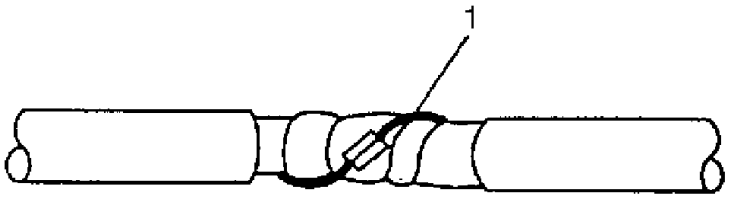
Twisted/shielded cable is used in order to protect wiring from electrical noise. Two-conductor cable of this construction is used between the radio and the Delco-Bose® speaker/amplifier units and other applications where low level, sensitive signals must be carried. Follow the instructions below in order to repair the twisted/shielded cable.



1. Remove the outer jacket (1). Use care not to cut into the drain wire of the mylar tape.
2. Unwrap the tape. Do not remove the tape. Use the tape in order to rewrap the twisted conductors after the splice is made.

3. Prepare the splice. Untwist the conductors and follow the splicing instructions for copper wire. Staggering the splices by 65 mm (2.5 in) is recommended.

Important: Apply the mylar tape with the aluminum side inward. This ensures good electrical contact with the drain wire.



4. Re-assemble the cable.
   - Rewrap the conductors with the mylar tape. If the mylar tape is damaged, use 3M product AL-36FR to replace the damaged mylar tape.
   - Use caution not to wrap the drain wire in the tape (1).
   - Follow the splicing instructions for copper wire and splice the drain wire.
   - Wrap the drain wire around the conductors and tape with electrical tape to replace the outer insulation.

8.

9. Tape over the entire cable. Use a winding motion when you apply the tape.

Wiring Repairs/Splicing Inline Harness Diodes

Many vehicle electrical systems use a diode to isolate circuits and protect the components from voltage spikes. When installing a new diode use the following procedure.

1. Open the harness.
   - If the harness is taped, remove the tape.
   - To avoid wiring insulation damage, use a sewing ripper in order to cut open the harness.
   - If the harness has a black plastic conduit, pull out the diode.
4. If the diode is taped to the harness, remove all of the tape.
5. Check and record the current flow direction and orientation of diode.
6. Remove the inoperative diode from the harness with a suitable soldering tool.

Important: If the diode is located next to a connector terminal remove the terminal(s) from the connector to prevent damage from the soldering tool.

7. Carefully strip away a section of insulation next to the old soldered portion of the wire(s). Do not remove any more than is needed to attach the new diode.
8. Check current flow direction of the new diode, being sure to install the diode with correct bias. Reference the appropriate service manual wiring schematic to obtain the correct diode installation position.
9. Attach the new diode to the wire(s) using 60/40 rosin core solder. Before soldering attach some heat sinks (aluminum alligator clips) across the diode wire ends to protect the diode from excessive heat. Follow the manufacturer's instruction for the soldering equipment.
10. Reinstall terminal(s) into the connector body if previously removed.

Important: To prevent shorts to ground and water intrusion, completely cover all exposed wire and diode attachment points with tape.

11. Tape the diode to the harness or connector using electrical tape.

Wiring Repairs / SIR/SRS Wiring Repairs

Tools Required

J-38125 Terminal Repair Kit

The Supplemental Inflatable Restraint (SIR) System/Supplemental Restraint System (SRS) requires special wiring repair procedures due to the sensitive nature of the circuitry. Follow the specific procedures and instructions when working with the SIR/SRS, and the wiring components, such as connectors and terminals.

Important: Do not use the terminals in the kit in order to replace damaged SIR/SRS system terminals. Use either an SIR/SRS pigtail or a terminated lead from the SIR Repair Kit Tray.

The tool kit J-38125 contains the following items:

- DuraSeal splice sleeves, in order to repair the SIR/SRS wiring
- A special crimping tool
- A heat torch
- An instruction manual

The DuraSeal splice sleeves have the following 2 critical features:

- A special heat shrink sleeve environmentally seals the splice. The heat shrink sleeve contains a sealing adhesive inside.
- A cross hatched (knurled) core crimp provides the necessary low resistance contact integrity for these sensitive, low energy circuits.

The J-38125 also serves as a generic terminal repair kit. The kit contains the following items:

- A large sampling of common electrical terminals
- The correct tools in order to attach the terminals to the wires
- The correct tools in order to remove the terminals from the connectors

SIR/SRS Connector Repair (Plastic Body and Terminal Metal Pin)

The terminals in the SIR/SRS system are made with a special plating. This plating provides the necessary contact integrity for the sensitive, low energy circuits. Use theJ-38125 SIR/SRS Terminal Repair Kit for repairing SIR/SRS terminals and connectors. Do not substitute any other terminals for those in the repair kit.

The J-38125 SIR/SRS Terminal Repair Kit contains:

- Various terminated leads for sensing and diagnostic module (SDM) terminal replacement
- Various connector positive assurance (CPA) locks for SIR/SRS connectors
- Base of steering column pigtail connectors part number 12085514
- Yellow vinyl electrical tape

(continued on next page)

Wiring Repairs / SIR/SRS Wiring Repairs (continued)

Pigtail repair packs are available for SIR/SRS connectors with eight or less terminals. Only the connector body is available for connectors with more than eight terminals. The terminated leads in the J-38125 SIR/SRS Terminal Repair Kit can be used to replace damaged terminals when replacing the connector body.

SIR/SRS Component Wire Pigtail Repair

Important: Do not make wire, connector, or terminal repairs on components with wire pigtails.

A wire pigtail is a wire or wires attached directly to the device, not by a connector. If a wiring pigtail is damaged, you must replace the entire component, with pigtail. The inflatable restraint steering wheel module coil is an example of a pigtail component.

SIR/SRS Wire Repair

Important: Refer to Wiring Repairs in order to determine the correct wire size for the circuit you are repairing. You must obtain this information in order to ensure circuit integrity.

If any wire except the pigtail is damaged, repair the wire by splicing in a new section of wire of the same gage size (0.5 mm, 0.8 mm, 1.0 mm etc.). Use the DuraSeal splice sleeves and splice crimping tool from the J-38125 . Use the following wiring repair procedures in order to ensure the integrity of the DuraSeal splice sleeves.

Splice Sleeve Color	Crimp Tool Nest Color	Wire Gage mm^2/ (AWG)
Salmon (Yellow-Pink) 12089189	Red (1)	0.035-0.8/(18-20)
Blue 12089190	Blue (2)	1.0-2.0/(14-16)
Yellow 12089191	Yellow (3)	3.0-5.0/(10-12)
Green 88988379	Red (1)	0.22-0.35/(22-24)

Important: You must perform the following procedures in the listed order. Repeat the procedure if any wire strands are damaged. You must obtain a clean strip with all of the wire strands intact.

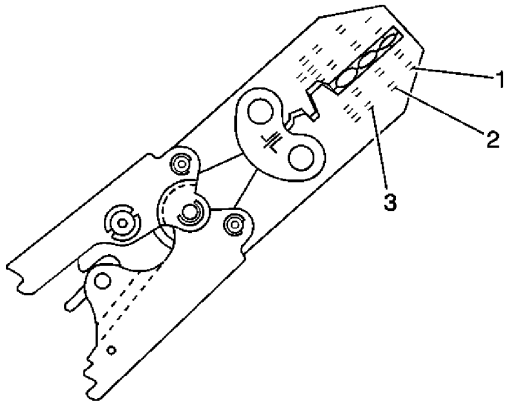
1. Open the harness by removing any tape:
   - Use a sewing seam ripper, available from sewing supply stores, in order to cut open the harness in order to avoid wire insulation damage.
   - Use the DuraSeal splice sleeves on all types of insulation except tefzel and coaxial.
   - Do not use the crimp and DuraSeal splice sleeve to form a splice with more than 2 wires coming together.
4. Cut as little wire off the harness as possible. You may need the extra length of wire in order to change the location of a splice.

   Adjust splice locations so that each splice is at least 40 mm (1.5 in) away from the other splices, harness branches, or connectors.

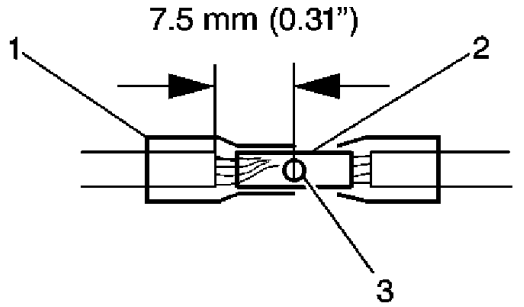
(continued on next page)

Wiring Repairs / SIR/SRS Wiring Repairs (continued)

5. Strip the insulation:
   - When adding a length of wire to the existing harness, use the same size wire as the original wire.
   - Perform one of the following items in order to find the correct wire size:
     - Find the wire on the schematic and convert the metric size to the equivalent AWG size.
     - Use an AWG wire gage.
     - If you are unsure of the wire size, begin with the largest opening in the wire stripper and work down until achieving a clean strip of the insulation.
   - Strip approximately 7.5 mm (0.313 in) of insulation from each wire to be spliced.
   - Do not nick or cut any of the strands. Inspect the stripped wire for nicks or cut strands.
   - If the wire is damaged, repeat this procedure after removing the damaged section.
13. Select the proper DuraSeal splice sleeve according to the wire size. Refer to the above table at the beginning of the repair procedure for the color coding of the DuraSeal splice sleeves and the crimp tool nests.



14. Use the Splice Crimp Tool from the J-38125 to crimp DuraSeal splice sleeve. In order to position the DuraSeal splice sleeve in the proper color nest of the Splice Crimp Tool. The crimp tool has three nests, 1 is for the salmon and green splice sleeve, 2 is for the blue splice sleeve, and 3 is for the yellow splice sleeve.



15. Place the DuraSeal splice sleeve in the nest. Ensure that the crimp falls midway between the end of the barrel and the stop. The sleeve has a stop (3) in the middle of the barrel (2) in order to prevent the wire (1) from going further. Close the hand crimper handles slightly in order to firmly hold the DuraSeal splice sleeve in the proper nest.

(continued on next page)

Wiring Repairs / SIR/SRS Wiring Repairs (continued)

16. Insert the wire into the splice sleeve barrel until the wire hits the barrel stop.
17. Tightly close the handles of the crimp tool until the crimper handles open when released.

    The crimper handles will not open until you apply the proper amount of pressure to the DuraSeal splice sleeve. Repeat steps 4 and 5 for the opposite end of the splice.

18. Using the heat torch, apply heat to the crimped area of the barrel.
19. Gradually move the heat barrel to the open end of the tubing:
    - The tubing will shrink completely as the heat is moved along the insulation.
    - A small amount of sealant will come out of the end of the tubing when sufficient shrinkage is achieved.

Connector Position Assurance (CPA)

The connector position assurance (CPA) is a small plastic insert that fits through the locking tabs of a connector. CPAs are used in all SIR System connectors and also in some connectors of other systems. The CPA ensures that the connector halves cannot vibrate apart. You must have the CPA in place in order to ensure good contact between the mating terminals of a connection.

Terminal Position Assurance (TPA)

The terminal position assurance (TPA) insert resembles the plastic combs used in the control module connectors. The TPA keeps the terminal securely seated in the connector body. Do not remove the TPA from the connector body unless you remove a terminal for replacement

Lighting/Separating Stop from Turn Signal Lamps

The 2008 Medium Duty C-Series trucks have single red tail lamp assemblies that function as stop/turn/hazard lamps. Many applications call for separating the brake lamps from the Turn/Hazard function or adding additional Amber Turn / Hazard lamps. The procedure for implementing Amber Turn /Hazard Lamps is outlined below.

1. Remove the CHMSL relay (Page B-18, Fuse Block - I/P-2). Carefully cut off the "87" terminal from the relay to eliminate the brake function from the existing lighting system.
2. Re-install the modified CHMSL relay.
3. Additional Turn lamps can be wired to 318 (Left Turn) and the 319 (Right Turn) circuits in the Body Builder or Bus Connector.

Important Notes:

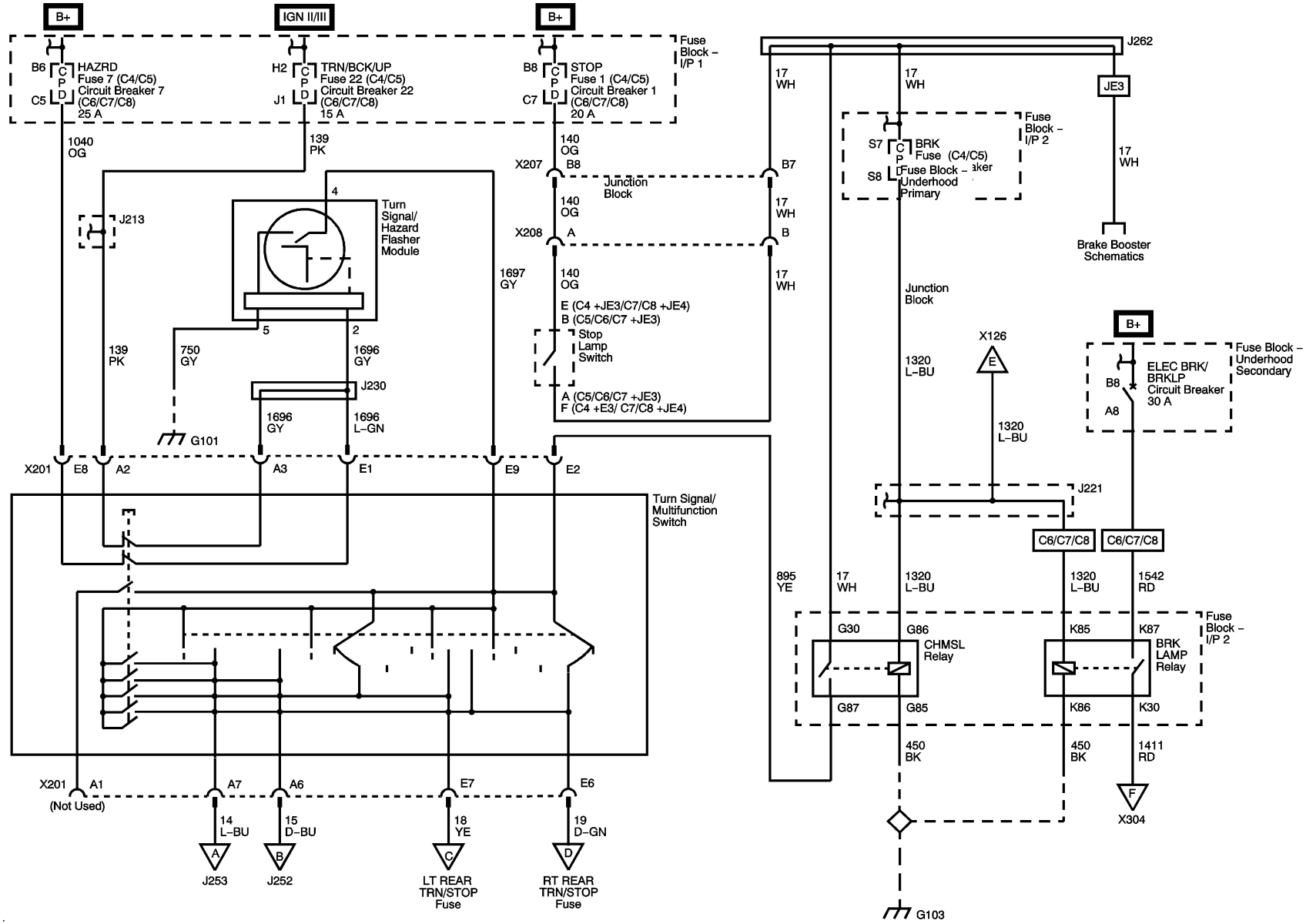
(a) It is the responsibility of the upfitter to meet all FMVSS lighting requirements. The upfitter must also ensure that the combined current of any additional lighting does not exceed the circuit fusing.

(b) Operation without the CHMSL relay installed will disable the Power Take-Off (PTO) system.

(c) Operation without the CHMSL relay installed eliminates the Brake Lamp function at the 7-way Family 2 Trailer Connector.

(continued on next page)

Lighting/Separating Stop from Turn Signal Lamps (continued)



California Air Resource Board (CARB) Idle Shutdown Regulations

REGULATION

The California Air Resource Board (CARB) has formulated new idle shutdown requirements applicable to 2008 model year heavy duty diesel engines operating in vehicles greater than 14,000 lbs. GVW. According to this regulation, all new 2008 and subsequent model year heavy duty diesel engines shall be equipped with an engine shutdown system that automatically shuts down the engine after 300 seconds of continuous idling operation once the vehicle is stopped, the transmission is set to "Neutral" or "Park", and the parking brake is engaged. If the parking brake is not engaged, then the engine shutdown system will shut the engine down after 900 seconds of continuous idling operation once the vehicle is stopped and the transmission is set to "Neutral" or "Park".

The engine shutdown system is tamper resistant and non-programmable and cannot modify the software/calibration to enable or disable the engine shutdown system.

DRIVER WARNING

A warning signal (light or sound indicator inside the vehicle cabin) will be used to alert the driver 30 seconds prior to engine shutdown. The engine shutdown system is capable of allowing the driver to reset the engine shutdown timer by momentarily changing the position of the accelerator, brake, or clutch pedal or by shifting the transmission out of "Park" or "Neutral". Once reset, the engine shutdown system will restart the shutdown sequence described above and will continue to do so until the engine shuts down or the vehicle is driven.

ENGINE SHUTDOWN SYSTEM OVERRIDE

The engine shutdown system may be overridden to allow the engine to run continuously at idle, only under the following conditions:

(1) If the engine is operating in the PTO mode. The PTO system switch will have a switch to override the engine shutdown system and will be reset to the "OFF" position every time the vehicle's engine is turned "OFF". This has been accomplished by changing the current "ON/OFF" PTO switch to a momentary PTO switch. Additionally, the PTO switch has been designed so that if it fails it will always fail in the "OFF" position.

(2) If the vehicle's engine coolant temperature is below 60°F. The engine shutdown system will be automatically activated once the coolant temperature reaches 60°F or above. The engine coolant temperature is measured with the engine's existing engine coolant temperature sensor

EXEMPT VEHICLES

Heavy Duty diesel engines to be used in buses as defined in California Vehicle Code #233, 612 and 642, school buses as defined in California Vehicle Code #545, and recreational vehicles as defined in Health and Safety Code18010 are exempt from these idle shutdown requirements. The idle shutdown system will not be provided on exempt vehicles and Federal vehicles.

IMPLEMENTATION TIMING

The idle shutdown program will be implemented in January, 2008.